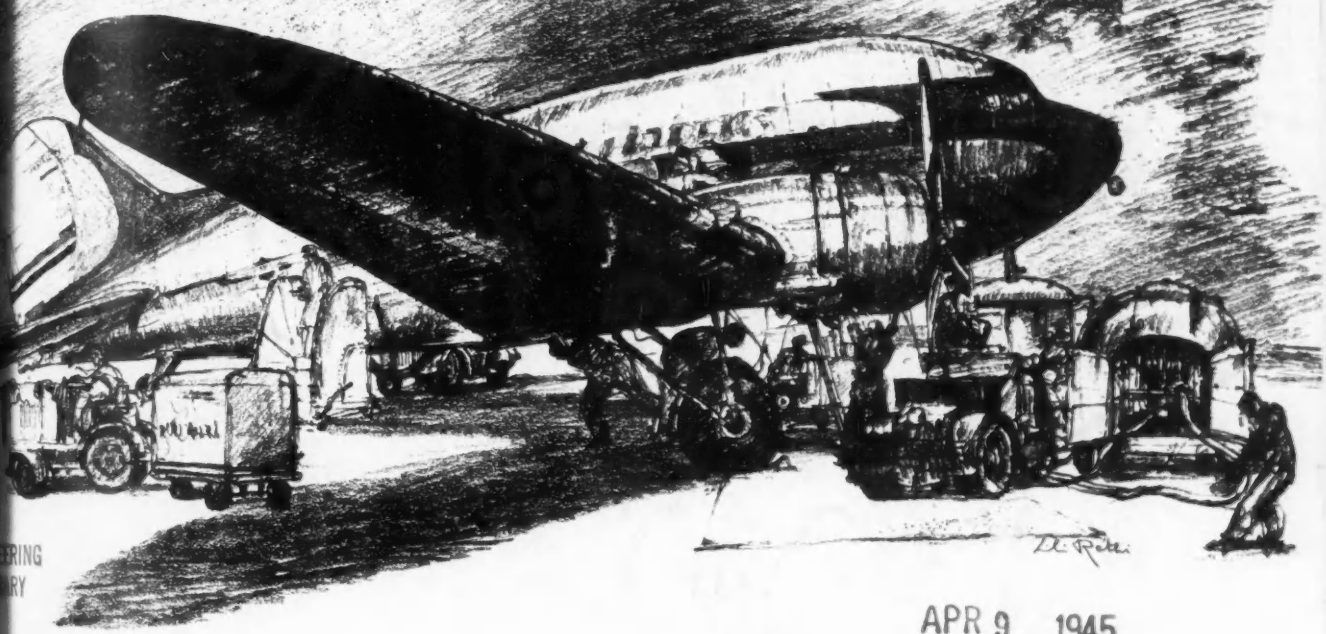
S·A·E Journal



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High-Altitude Factors in Flight Testing —Marvin L. Michael and Sidney R. Silber

Power Steering for Automotive Vehicles —Francis W. Davis

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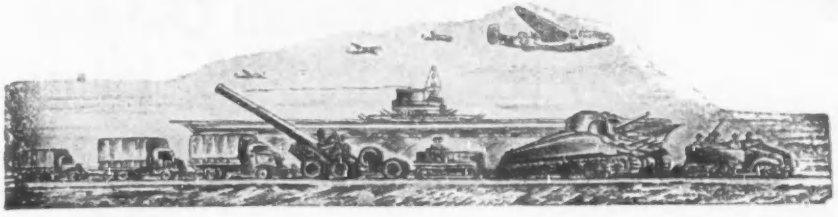

News of the MAY *Issue*

By Norman G. Shidle

Wait-Savers

BLESSED are those who never have to wait . . . for trains, for wives to finish dressing, for business associates to catch up to schedule . . . for the million tantalizing delays which beset most of us.

There are such men. Two kinds, in fact.

One of them is easily recognized. He is the busy efficient chap who always catches trains by an eyelash; is always a little late for appointments so that others wait for him; always has his time planned carefully for weeks ahead. Others do most of his waiting for him. This method of wait-prevention can be practiced successfully only by a very powerful executive or a very beautiful woman. Few could emulate, even if they would.

The other kind of wait-saver, though not uncommon, is less readily spotted. He moves calmly through his daily rounds, arriving smoothly ahead of time for trains, meetings and appointments. But when he gets there, he doesn't wait for the train to start or the appointment to be met. He doesn't mop his brow, crack his knuckles, or shuffle his feet. He looks about for a person or a vista which may hold pleasure or interest – and often finds one. He has new experiences in the time which many spend in fretting.

In case he isn't lucky with his look, he blots the immediate scene from his mind and goes to work on some unsolved problem, thinks through some question which has been bothering, turns his mind to pleasant or useful browsing, makes notes of ideas for future use.

He turns waiting time into creating time.

Progress Born In Clash Of Dreams and Realities

THE post-war period, until recently heralded as a veritable age of miracles, is being subjected to deflationary influences quite apart from war reverses. In fact, while the reverses themselves have been satisfactorily reversed, post-war ideas continue to clash with realities. The results tend to brand them as dreams, nice while they lasted, but unsubstantial.

Take, for instance, the case of post-war motor trucks. Pre-war trucks have been the target of a heavy and caustic barrage of criticism. The effect, if not the intent, was to give truck designers and manufacturers a first-degree inferiority complex.

Conflicting Desires

Against mounting clamor for functional design, accessibility, visibility, comfort, convenience, lower prices, greater loads, higher speeds, more agility, reduced fuel consumption, increased tire mileage, easier maintenance, and so on, only mild protest could be raised. In the midst of motorized warfare, with both military and civilian vehicles performing prodigious feats, the designers and manufacturers were able to give voice to one question, simple but pointed, innocuous but mighty: "The trucks run, don't they?"

The shouting and the tumult even now have reached the point of something less than demise, but the voices of these hardy engineers are being heard a bit more strongly in the land. This time they're asking a question based upon the same theme, but decidedly more pointed: "For what purpose, other than efficient operation, do you want motor trucks built?"

This diplomatic way of telling the customer he is quite right, of course, but might make up his mind as to his own needs represents the position of the truck designers and manufacturers to be stated in May *SAE Journal* by B. B. Bachman, of The Autocar Co. Mr. Bachman's article, representing a composite of views, will report that the possibility of improving truck design and construction was reasonably well known even before the customers raised their voices and the war interrupted.

The article will outline some of the trends in progress toward better post-war trucks as indicative of the success with which design evolution is picking its way along a road to the future rather thoroughly mined with conflicting factors. It will be suggested that the war probably will remove some of the restrictions and obstacles, but that truck designers and makers, far from being free to improve the vehicles to the best of their ability, still will be hedged about by such pertinent and frequently opposing factors as legal and safety requirements, sales appeal, operators' demands and needs, driver acceptance, economics. Having established these handicapping premises, Mr. Bachman will discuss, one by one, stated demands for changes, such as:

Program of Progress

- Cooling system. Vitally important, undoubtedly can be improved, but must be kept simple, practical, and durable.
- Electrical equipment. Not too good, but could be simplified and improved if buyers would cease making simultaneous demands for low prices and complicated electrical fittings.
- Unit replacement. Easily accomplished, and good if it works; but do buyers want trucks made to be repaired, or to run?
- Commodious cabs. Improvements under way prior to war's interruption.
- Performance. Governed by weight/horsepower ratio and legal weight restrictions; affected by many engineering complications.
- Engines. Higher power possible, perhaps practicable. Design and construction details, such as overhead valves, cylinder liners, rpm, bmep, and others subject to controversy among engineers and buyers.

continued on next page

Naval Warfare Puts Lubricants to Test On Worldwide Scale

BYPRODUCT of World War II is the operation by the U. S. Navy of a worldwide testing laboratory for diesel lubricants. Two- and four-cycle diesels ranging from 5 to 2000 hp propel on the Seven Seas all types of ships, from landing craft to destroyers, and drive auxiliary powerplants, generating sets, and other machinery.

Between January, 1941, and July, 1944, the Navy has found it possible to devise tests and ratings, to test 55 heavy-duty oils and straight mineral types, and to compile records in which demerits point failures and high scores confirm quality.

The story of these tests, of what they show, and of what improvements remain to be made, will be told in May *SAE Journal* by Lt. A. D. Brabbs, USNR, Naval Engineering Experiment Station.

Post-War Trucks

cont. from p. 9

• Transmissions. Difficult engineering problems involved, with experience and developments affording hope for substantial improvement.

• Rear axles. Subject to engineering controversy.

• Brakes. Important, complicated engineering problems involved, with coordinated study essential to improvements.

• Suspension. Engineering problem now being attacked from many different angles.

• Legal limitations. Marked by conflict with engineering requirements and confused by lack of uniformity, but wartime changes in regulations offer hope for improvements.

Armed Forces Forage For Fuels; Make Them Work, Even in Arctic

TRIALS and tribulations of armed forces called upon to "live off the land" are aggravated when those forces are motorized, for engines are disinclined to be overly tolerant about diet. Since field operations customarily are carried on in isolated areas, the problem of supplying satisfactory fuels and lubricants can become serious.

For instance, increased consumption of diesel fuels coupled with shortage of transportation facilities, could make military operations in Alaska and Northwestern Canada decidedly difficult. That is exactly what happened, and with only 35-cetane-number fuels available, even at a distance, and with Arctic weather consistently in the −40 F bracket, conditions became rugged.

The fact that the enemy has been driven from this theater, however, is proof that ways and means were found to operate. How that was done will be told in May *SAE Journal* by L. W. Griffith, of Shell Oil Co., and R. C. Williams, of Caterpillar Tractor Co. It is the story of cooperative effort, and it will reveal that automotive diesels can be operated on 35-cetane-number fuels in subzero temperatures.

The Cover

Activity at the airport builds up to a peak as big transports are refueled and finally checked before the "all clear" signal. The combined skills of designers and transport operators blend to make new carrier history every time one of these beneficent giants takes to the air.

At La Guardia Field, where a plane arrives or leaves every 60 seconds, this month's cover picture was drawn by Artist Lili Rethi as the ground crew readied a typical modern transport for a routine flight.

Devise Continuous Overhaul System for Post-War Planes

ONE of the wartime slogans which appears destined for immortality is "Keep 'em flying!" Air transport maintenance engineers are adopting it without amendment. Reasons are economic as well as sentimental, for only the plane that is flying can be profitable.

The engineers are talking in terms of completely overhauling commercial planes every 5000 hr without taking the aircraft out of service. Depending upon trouble frequency experience, functional units are to be overhauled from once to 10 times. The longest single grounded period for maintenance purposes would be 6 hr.

Maintenance engineers are working toward this goal by starting with design for swift, easy maintenance; developing maintenance equipment and facilities; training personnel; and even scheduling maintenance operations in advance.

The undertaking has reached the point where mock-ups can be used not only as ground trainers for maintenance crews, but as test models which indicate whether, and how, the equipment is designed and installed so as to assure at least 18 hr daily utilization of the plane. If the mock-up even suggests a threat of maintenance delay, modification gets under way. Preferable, the engineers say, is design for maintenance.

Coupled with design and maintenance procedure is the development of maintenance equipment and facilities which not only expedite ground operations, but accommodate functional testing of interchangeable units. Interchangeability is given premium status. Included in the equipment are service pits, stands, racks, and cradles reminiscent of ground vehicle service stations, but necessarily built upon a gigantic scale.

In fact, everything about air transport maintenance plans border upon the gargantuan. This has to be, for the engineers are talking of servicing four-engine ships weighing around 200,000 lb – larger than any hangar practicably can accommodate.

Reagan C. Stunkel, of Lockheed Aircraft Corp., tells the story in May *SAE Journal*. Incidentally, Mr. Stunkel will present, in addition to pictures of available and proposed air transport servicing equipment, an inspection and overhaul sheet which looks to be the answer to a mechanic's prayer. It includes photographs of each unit, both assembled and exploded, and it gives detailed instructions for disassembly, assembly, and functional testing.

Seek Grease for Army Amphibians

GOOD example of tasks pacing accomplishments is the Army's current search for a satisfactory wheel bearing grease for its amphibian equipment. The Army's General Purpose Grease No. 2 seems to be adequate for the job if preventive maintenance is possible; but landing operations, particularly under enemy fire, seldom permit of such activities.

The problem develops after the Army, aided by industrial technologists, has succeeded in consolidating its grease requirements and in developing lubricants which withstand extremes of temperature. Now the demand is for grease which will remain in the wheel bearings of amphibian equipment without thinning.

Interesting report on the development of greases for motorized military equipment, with a statement of current and future needs, will be presented by Major N. W. Faust, Ordnance Department, in May *SAE Journal*. Major Faust will describe the Army's practical grease tests and report field experience with the present five types.

USE PROPELLERS AS BRAKES FOR EASIER AND SAFER LANDING

ONE of the fundamental problems of aircraft operation appears to have made full cycle within comparatively a few years. Getting the plane off the ground no longer is difficult. Getting it back on again safely, within reasonable space, and without damage is something else again.

Particularly as planes become larger, heavier, and swifter does the problem become aggravated. Weights in six figures and landing speeds in three mean plenty of plane to stop. Brake and tire wear become intensified. Strains and stresses border upon the terrific.

One suggested solution – utilization of reverse-thrust propellers as landing brakes – will be outlined in May *SAE Journal* by Jack H. Sheets and Gordon W. MacKinnon of Curtiss-Wright Corp., Propeller Division. They will say that landing space can be cut almost in half, brake and tire wear substantially reduced, brake equipment lightened, design of the whole plane improved, and other benefits assured by operating modern controllable pitch propellers in the negative blade angle to take advantage of a tremendous reverse thrust.

CHEMISTRY OFFERS HOPE FOR CURE OF PISTON RING ILLS

RECENT attack on the problem of piston ring sticking has been made through chemistry. Basic psychology is that ascertaining the chemistry of the formation of ring deposits would reveal ways to prevent the troublesome phenomenon.

May *SAE Journal* will present a progress report on the undertaking in the words of G. H. Denison and J. O. Clayton, of California Research Corp., a subsidiary of Standard Oil Co. of Calif.

Theirs will be a success story. The chemistry of ring deposits is known; also the remedial noncorrosive, anti-ring-sticking additives.

SAE Journal

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The Society is not responsible for statements or opinions advanced in papers or discussions at its meetings or in articles in the Journal.

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Synthetic Rubber Bellows—tail seals on shaft. Head is flexible; adjusts for washer wear, shaft vibration, end play.
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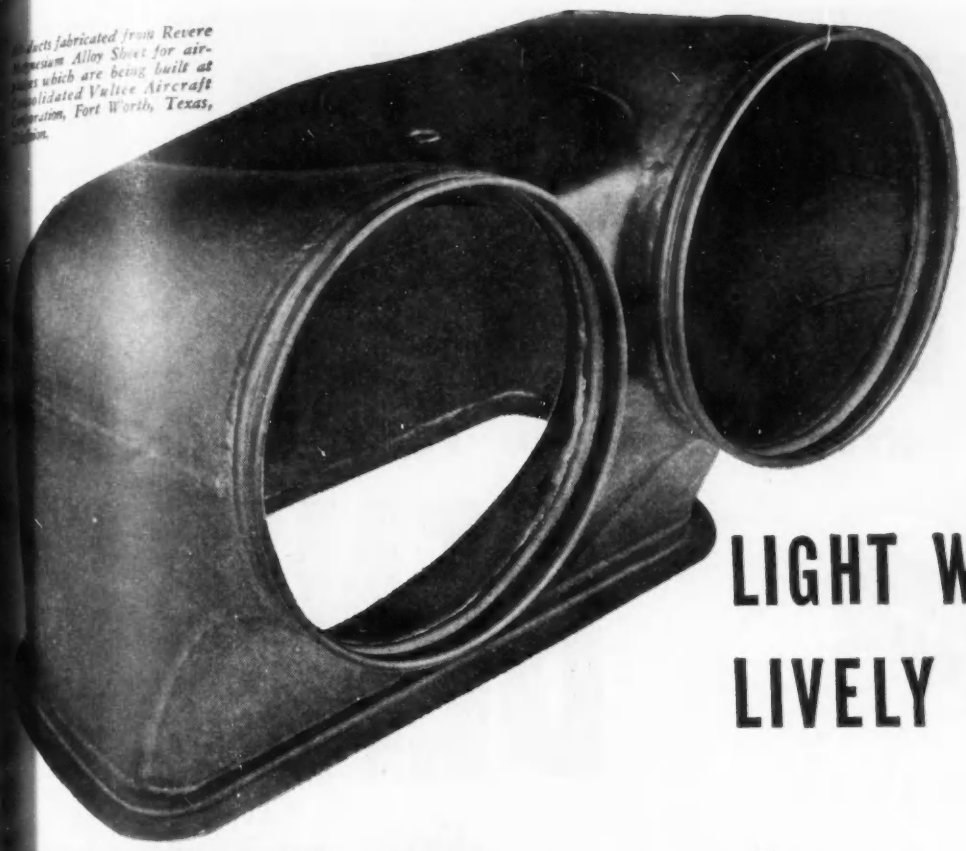

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Remember that it costs money to move anything—trucks, trailers, elevator cages, railroad cars, buses, *anything*. And it costs money to ship to, and move around a plant, the materials of which they are made. It takes effort to move such common articles as vacuum cleaners, hand tools, portable typewriters, chairs. Weight reduction will be *so* important after the war!

Revere Magnesium Alloys are available now in the form of sheet and plate, rod and bar, tubes and shapes, forgings and forging stock. The Revere Technical Advisory Service will gladly assist you in obtaining magnesium's maximum advantages... Write for your complimentary copy of the new 32-page booklet, "Revere Magnesium Alloys and the Light Metals Era."

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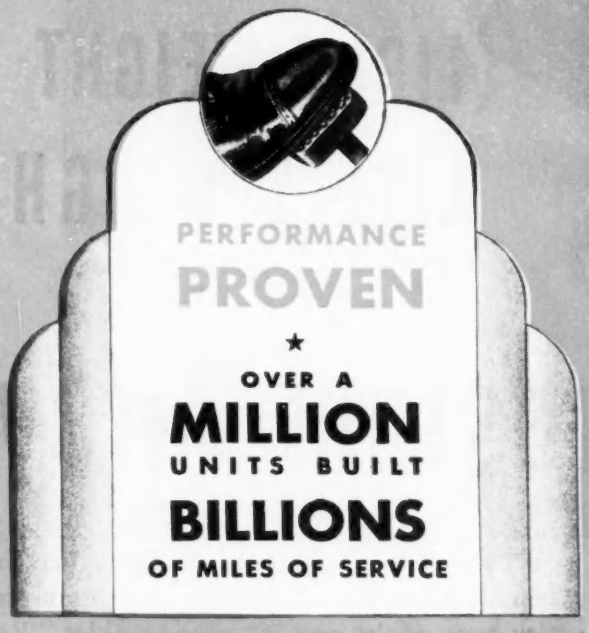

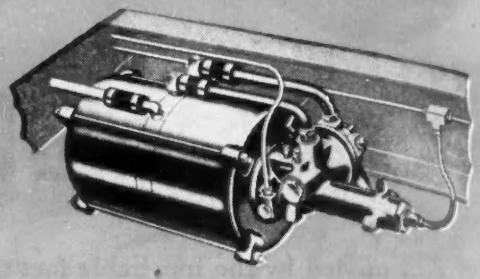

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SAE President

J. M. Crawford REPORTS

basis of Council action interpreting SAE Constitution to mean that Society operations and activities shall be limited to the technical and scientific area . . .

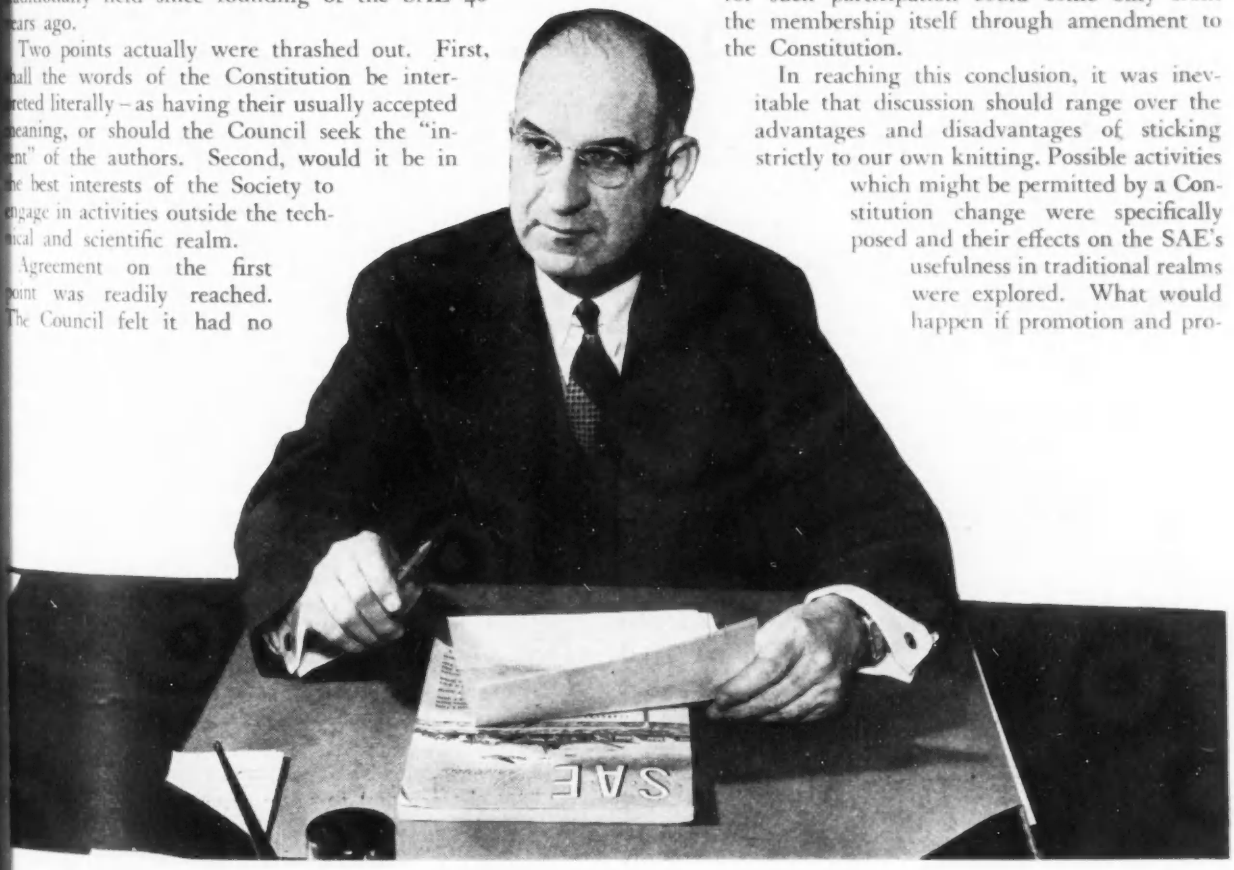
SHORTLY before I took office as President, the SAE Council acted officially to express its belief that the ociety's Constitution should be interpreted literally when says that *"The object of the Society is to promote the rts and Sciences and Standards and Engineering Practices* nnected with the design, construction and utilization of tomotive apparatus, and so forth;" in other words, that -2 of our Constitution means the operations and activities the Society shall be limited to the technical and scientific ea. At the same time, it acted to insure Section con- rmity to this broad policy by delineating in some detail e conditions under which a Section may participate as n affiliate of any local organization.

Members will be interested, I believe, as I was, to know e reasoning which led to this re-affirmation of a position aditionally held since founding of the SAE 40 ars ago.

Two points actually were thrashed out. First, hall the words of the Constitution be inter- reted literally – as having their usually accepted eaning, or should the Council seek the "in- nt" of the authors. Second, would it be in e best interests of the Society to ngage in activities outside the tech- ical and scientific realm.

Agreement on the first oint was readily reached. he Council felt it had no right to try to read meanings into the words of the Constitution other than those which any ordinary member or reader would find. It turned its back definitely on the Humpty-Dumpty theory that: "When I use a word it means exactly what I want it to mean." It seemed clear to every Council or that the SAE Constitution means just what it says when it authorizes the Society to function only in "the Arts and Sciences and Standards and Engineering Practices connected with the design, construction and utilization of automotive apparatus, all forms of self-propelled or mechanically propelled mediums for the transportation of passengers or freight, and internal-combustion prime movers." If the SAE were to participate in other than the technical and scientific areas indicated by this reading, the Council agreed unanimously, authorization for such participation could come only from the membership itself through amendment to the Constitution.

In reaching this conclusion, it was inevitable that discussion should range over the advantages and disadvantages of sticking strictly to our own knitting. Possible activities which might be permitted by a Constitution change were specifically posed and their effects on the SAE's usefulness in traditional realms were explored. What would happen if promotion and pro-



Local Meetings Replace National

ON Feb. 27, the War Committee on Conventions rejected a well-documented request from the Society of Automotive Engineers for permission to hold a National Aeronautic Meeting in New York on April 4-6.

Immediately following that rejection, the General Meetings Committee, with the approval of the SAE Council, embarked on development of an extensive series of local meetings.

At the projected local meetings will be presented the papers written and scheduled for SAE National Meetings – until such time as petitions for permission to hold national gatherings seem likely to meet with success.

In this way, with the active cooperation of SAE Sections as hosts and operators of these local meetings, the SAE will be able to carry to its members the war-needed information contained in these technical papers and to promote the interchange of engineering facts and ideas which have an important part in winning the war.

The projected series of meetings will be local in every respect. Notices will go from the host Section only to the regular local Section mailing list. There will be no advance national publicity or promotion. Length of each meeting will be confined to a one-day maximum – a maximum normal to SAE Section meetings in the past. The number of speakers, chairmen, and national officers attending any one of these meetings from out of town will be well within the limit of 50 established by the War Committee on Conventions as permissible.

Every effort will be made to develop the best *local* meetings possible. Under no circumstances will *anything* be done to permit evasion of either the letter or the spirit of the War Committee on Conventions regulations.

The first of the projected local meetings will result from a breaking-up of the National Aeronautic Meeting into a series of local meetings, arrangements for which already have been completed in New York, Dayton, Buffalo, Detroit and Kansas City.

The National Diesel-Fuels & Lubricants Meeting (scheduled for Cleveland, May 16-17) has been split into two one-day Section-sponsored meetings, one in St. Louis, May 15, and the other in Cleveland, May 17.

A one-day Pittsburgh Section Meeting on May 9 replaces the two-day National T&M Meeting originally scheduled for Pittsburgh.

The National War Materiel Meeting (originally scheduled for Detroit in June) is being distributed as a series of one-day Section meetings, one of which will be in Detroit, June 4.

continued from preceding page

tection of the economic interests of automotive engineers were made a part of the SAE's function? If labor relations were admitted to the scope of its activities? If the influencing of legislation affecting the interests of automotive engineers were assumed as a part of SAE responsibilities? These and similar questions were examined carefully – and, I believe, logically. An exhaustive memorandum dealing particularly with the three subjects mentioned formed the basis for important phases of the debate. (I shall be glad to send a copy of that memorandum to such members as may be interested.)

Net result of these widespread discussions was conclusion by the Councilors that the Society's power to serve its membership fully is greatly strengthened by continued concentration in the technical and scientific areas to which its facilities are adapted, in which its ability to operate successfully has been proved, and where the potentials for member and industry service remain almost unlimited. They agreed, in a nutshell, that much is to be gained by our sticking to the job we are organized to do – and by continuing to do that job just as aggressively and effectively as we know how.

Recognizing clearly the need for engineering influence in these other fields of action, the Councilors concluded unanimously that any SAE attempt at participation as an organization could result only in decreased effectiveness in the fields where we now are engaged. Participation by automotive engineers as individuals, however, through other groups already organized – or perhaps yet needing to be organized – was not discouraged.

It was pointed out, for example, that the SAE has no ready means of synthesizing the opinion of its members on political, economic or labor problems; that divisions of opinion on such problems almost certainly exist among its members; and that such divisions on these currently extraneous subjects could easily diminish drastically the traditionally successful cooperative exchange of ideas and data among members, or as the means through which a consensus of competent technical opinion may be conveyed to outside agencies, chiefly *at the request of those agencies.*

The SAE by its very nature is equipped to function effectively, it was emphasized, as a forum for discussion. It is ill-equipped, if at all, to act as a promotion or propaganda agency for any set of ideas, however sound, excellent and laudable they may be. By trying to be something we are not, the Council feels, we might easily cease being anything of value.

The conclusions reached by the Council's discussions – in which I participated personally to a very limited extent since I was not a member of the 1944 governing body – impress me as sound in principle and far-seeing in vision.

Particularly am I impressed with the importance of automotive engineers' participation as individuals in those civic and technical organizations which are set up specifically to represent the interests of engineers in carrying out activities in connection with civic, political and economic projects. The fact that I am serving concurrently as secretary of the Engineering Society of Detroit and as your SAE President is witness to my firm belief in the separate scopes and effectiveness of both types of organization.

In any case, I believe that SAE members will see these SAE Council conclusions as a means of making our Society an ever sharper tool to perform the job for which it is designed – and that the edge of its member and industry service should not be blunted by trying to apply it to jobs which others could be much better organized to do.

News..

..OF THE SOCIETY

Special SAE Aero Subdivision Will Study Miscellaneous Topics

FORMED to handle engineering projects outside the scope of the four established subdivisions of the SAE Aeronautics Division, the new Special Aircraft Projects Subdivision, headed by Peter F. Rossmann, general manager of the Development Division, Curtiss-Wright Corp., already has four working committees.

Whereas the emphasis of the Aircraft Engine, Accessory & Equipment, Propeller, and Materials & Processes Coordinating Subdivisions has been upon standardization, recommended engineering practices, and specifications, the attention of the new subdivision will be focussed upon research and development. The jurisdictions of each of the four older subdivisions have been clearly defined, but an increasing demand has been found for miscellaneous coordinated research and development on engineering problems affecting more than one of the fields covered by these groups, it was explained by Arthur Nutt, chairman of the SAE Aeronautics Division.

Overall problems, such as drafting room practices, are indicative of the trend of the new subdivision's development. Organized more than four years, the Committee on Aircraft Engine Drafting Room Practices, has issued two editions of a manual on this subject. But the need of coordinating all drafting practices for engines, propellers, and accessories is a pressing one, and the new committee, under the new subdivision, will be composed of the present group representing aircraft engine manufacturers as well as drafting room executives of propeller, accessory, and other manufacturers. The new committee, S-1, will be headed by O. E. Kirchner, chief engineer of American Airlines, Inc.

Intensified interest in the development of helicopters was the reason for forming Committee S-2 on Helicopters. Headed by R. H. Prewitt, Kellett Aircraft Corp., its membership includes Com. R. E. Doll, Navy Bureau of Aeronautics; Michael E. Gluhareff, Sikorsky Aircraft; W. Laurence LePage, Platt-LePage Aircraft Co.; J. P. Perry, G & A Aircraft, Inc.; Frank Piasacki, P-V Engineering Forum; Stephen H. Rolle, CAA; Major K. S. Wilson, AAF Air Technical Service Command, and R. A. Wolf, Bell Aircraft Co.

Already intense study is being made of recent developments in flexible couplings, and manufacturers of universal joints have been invited to attend the next meeting to discuss the basic problems of application of these couplings to helicopter structures.

Among the basic problems to be handled by this group, according to Chairman Prewitt, will be test procedures and requirements for helicopter powerplants, including cooling systems, and test procedures and requirements for transmittal of power between the engine and rotor blades. The long established and successful coordinated engineering research techniques of the SAE are counted upon to advance basic engineering and design of this type of aircraft.

Committee S-3, Inspection Stamps and Symbols, is another example of a project which will serve the interest of several specialized aeronautical groups. Currently, many types of contractors' inspection stamps are in use in the aircraft manufacturing industry. Thirty-three have been analyzed by the committee, and it has undertaken the task of presenting four types of stamps to the industry, with view of obtaining general industry acceptance. The confusion, engendered by numerous stamps would be eliminated to a large extent, it was pointed out by members of the committee, by general adoption of these four.

These stamps are: Acceptance, the symbol being a circle; Acceptance by the Materials Review Board, an equilateral triangle with rounded corners; Rejection, an R, and a Magnetic Acceptance symbol, which is an M. Code letters and figures indicate the manufacturer who made the inspection of the part.

Committee S-3 is under the chairmanship of E. H. Kelley, Chevrolet Division, General Motors Corp., and is composed of E. A. Brittenham, Goodyear Aircraft Corp.; Gustaf Carvelli, Wright Aeronautical Corp.; R. E. Cummings, Thompson Products, Inc.; J. H. Q. Dohse, Ford Motor Co.; R. B. Fehr, Packard Motor Car Co.; John Fink, Pesco Products Co.; V. C. Frost, Republic Aviation Corp.; William Newberg, Dodge Division, Chrysler Corp., and R. L. Nolf, Bendix Aviation Corp.

Transfer of a former engine Committee to the new SAE Special Aircraft Projects Subdivision has been made to better coordinate its assignment with other aeronautic groups interested in the engineering problems involved. Members of this group, redesignated as S-4, Cold Starting Requirements, include G. A. Bleyle, Wright Aero-

PETER F. ROSSMANN, chairman of the New SAE Special Aircraft Projects Subdivision

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[redacted] WITH deep sorrow we report the death of New England Section Field Editor James T. Sullivan, whose notable contributions to the *Boston Globe* over a period of 42 years as well as his intense interest in automotive activities rated him as dean of newspaper automobile editors in the United States.

The Society of Automotive Engineers knew him especially as a true and helpful friend for more than 20 years, richly deserving of the Distinguished Service Citation recently awarded him by Automobile Old Timers. His passing on March 5 is a great loss – for his support of SAE National meetings and loyalty to the efforts of the New England Section was an inspiration to all who associated with him.

nautical Corp., chairman; Floyd Dougherty, Allison Division, General Motors Corp.; C. R. Paton, Packard Motor Car Co.; A. Pomeroy, Ranger Aircraft Engines; B. J. Ryder, Lycoming Division, The Aviation Corp.; W. H. Sprenkle, Pratt & Whitney Aircraft; B. W. Geddes, Standard Oil Development Co., and H. C. Riggs, Electric Storage Battery Co.

Joint Group Studies Welding and Brazing

TO analyze current metal joining practices applicable to the automotive industry, a joint project has been undertaken by several SAE and other engineering groups for materials and equipment specifications.

SAE representation is headed by the new Subdivision on Metal Joining Materials under the chairmanship of W. C. Schulte, Curtiss-Wright Corp., Propeller Division. The group is composed of the SAE Iron & Steel Division members, and representatives of the SAE Non-Ferrous Metals Division, and will work closely with representatives of the American Welding Society and the American Society of Mechanical Engineers.

R. W. White has been designated by the Army Ordnance Department as its representative in the project.

Reports of the project, when they reach agreement of the members and upon approval of the Standards Committee, will be published in the SAE Handbook.

Representing AWS is J. H. Depler, chief engineer, Metal & Therimit Corp. SAE members include H. D. Bubb, Jr., Thompson Products, Inc.; J. M. Diebold, GMC Truck & Coach Division; H. Sparks, Chrysler Corp.; E. C. Smith, Republic Steel Corp.; W. C. Lang, Chrysler Corp.; Joe Gurski, Ford Motor Co.; A. M. Setapen, Handy & Harman, and R. H. Terry, Detroit Diesel Engine Division, General Motors Corp.

Helical & Spiral Spring Manual

THE first and second printings of the "Manual on Design and Application of Helical and Spiral Springs," written by the Spring Committee of the SAE War Engineering Board, have been exhausted.

Before undertaking a third printing, the SAE Special Publications Department would like to know if SAE Members would be interested in obtaining additional copies of this 37-page, 8½ x 11 in. illustrated manual at 50¢ per copy. The price to non-members will be $1.50.

This manual was originally written at the request of the Army Ordnance Department to the SAE. The Spring Committee was formed under the chairmanship of Tore Franzen, Chrysler Corp., and consists of 31 members representing major vehicle, parts, and spring manufacturers, and Ordnance experts. It covers Fundamental Considerations, Important Factors in Spring Design, Spring Materials and Maximum Design Stresses, General Spring Tolerances, Spring Design Formulas, References on Material Specifications, and Specification for Alloy Spring Wire.

If you are interested, please address the Special Publications Department, Society of Automotive Engineers, 29 West 39th Street, New York 18, N. Y.

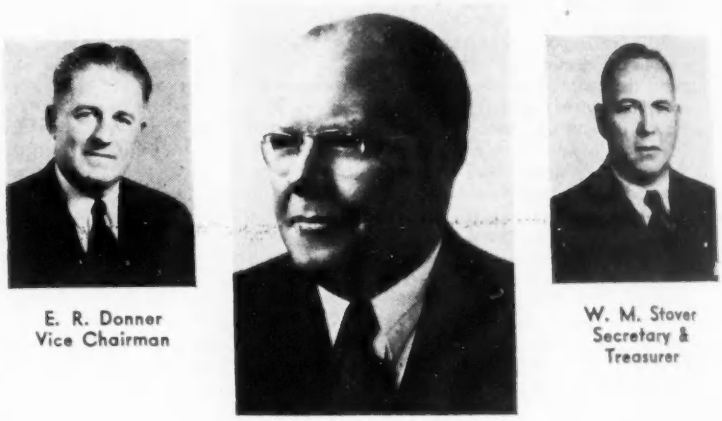
Rambling Throug Sect

LITERALLY pausing in Detroit at the end of a 25,000 mile inspection tour of the Pacific, the Hon. Artemus L. Gates, Assistant Secretary of the Navy for Air, addressed the **DETROIT SECTION** Feb. 5 on "Naval Aviation Today in the Pacific" . . . Audience of over 700 heard from the Secretary, who had been in the Philippines a week before the meeting, that there are to be substantial changes in the nature of Pacific air warfare, one of which is that a new jet-propelled fighter plane will soon be ready to join the Fleet . . . Another innovation, already in effect, is that the plane complements of the Essex class carriers have been altered to include a large number of fighter bombers capable of carrying a 1000-lb bomb at 400 mph within a limited range . . . Lauding the new striking forces of our Navy, which have been beating back the Japs toward their homeland, Mr. Gates nevertheless warned that the enemy's production and quality of aircraft and other weapons have steadily improved, and that they have large reserves of all kinds of military personnel . . . His sober conclusion was that we are only now beginning to test Japanese defensive strength . . .

War on the Western front as viewed first hand was reported at the dinner by Kenneth Crawford, war correspondent of *Newsweek*, who was one of 200 correspondents to participate in the invasion . . .

Finale of a stimulating session was showing of color motion picture, "Fighting Lady," the story of an aircraft carrier with a glorious history of action in the Pacific . . .

At its first meeting Feb. 12, nearly 60 members of the **SALT LAKE GROUP** heard Tom Collins, Cummins Engine Co., discuss "Post-War Diesel Engines," following the election of the Group's new officers. Elected chairman, J. Leonard



E. R. Donner
Vice Chairman

J. Leonard Love
Chairman

W. M. Stover
Secretary & Treasurer

Love, Koepsel & Love, introduced the new vice-chairman, E. R. Donner, Standard Oil Co., and W. M. Stover, Sealed Power Corp. These officers will guide the destinies of this new SAE organization whose territory embraces 15 counties of the State of Utah.

Why and how of Ordnance inspection was theme of Lt.-Col. George M. Enos' talk at **CINCINNATI SECTION** Jan. 18. Col. Enos disclosed a new policy followed by the Ordnance Department in speeding up procurement of needed material . . . The colonel, representing Cincinnati Ordnance District, explained that the Army has found it possible to secure high quality supplies by the standard sampling method, thereby eliminating time-consuming individual item and part inspection, and contributing a saving in manpower . . . Exhibited were a number of defective metal parts, and photomicrographs of desirable and undesirable grain structure in metal parts for use in ammunition were projected . . .

A different but equally important subject consumed the latter half of the meeting, when Walter J. Cake, project engineer, Wright Aeronautical Corp., spoke about airplane testing and performance . . . Slides illustrated his analysis of the effect of altitude on engine performance and of how conditions can be simulated at various altitudes by closely controlling pressure and temperature in the test engine laboratory on the ground . . .

Section Reports

Climax of session was a two-reel Army motion picture depicting technique and tactics used in establishing a beachhead in the South Pacific area . . .

Inaugurating a series of SAE dinner meetings in addition to traditional joint meetings with the Technology Club, some 35 members and guests of **SYRACUSE SECTION** convened at the University Club on Feb. 23 . . . A good old-fashioned

Walter W. Burrows, administrative engineer, Aircooled Motors Corp., is Syracuse Section's newly elected chairman, replacing E. R. Fish in that office

steak dinner preceded the technical session at which E. G. Murray, chief engineer, Richardson Boat Co., presented his paper, "Previewing the Post-War Boat," which will be digested in a later issue of the *SAE Journal* . . . At the close of his paper, Mr. Murray showed two invasion films, "Battle for the Beaches" and "Normandy" which included shots of landing craft vehicle and personnel (LCVP), such as are now being produced by his company, participating in actual combat landing operations . . .

Proper selection of trucks for fleet operations can almost be reduced to a mathematical formula in which capacity, load, operating conditions and the speed needed are the "unknowns" . . . So spoke Emil P. Gohn, chief test engineer, Atlantic Refining Co., to audience at **CLEVELAND SECTION'S** Feb. 12 meeting . . . He emphasized that conversion is often necessary even if trucks have been carefully selected, and his own complete study of truck conversion enabled him to point out the many factors involved . . . Coffee-talker M. W. Rue, chief engineer, Cleveland Transit System, gave local color to the meeting with a brief outline of his company's post-war plans for transit in the City of Cleveland . . .

History of the use of metal powders, begun as early as 1600 years ago and developed to the point where they are today capable of being produced in large quantities, was described at March 12 meeting of Cleveland Section by Raymond B. Aufmuth, chief product development engineer, S. K. Wellman Co. . . . Blending, compacting, and sintering are fundamental steps necessary in production, he declared, whether the product be used in the smallest mechanism or in the brakes of the largest airplanes, and he went on to state that metal powders now offer improvements in such fields as self-lubricating bearing applications . . .

Before a near-record turnout of 418 members and guests of **CHICAGO SECTION**, John I. Yellott, director of the Institute of Gas Technology, Illinois Institute of Technology, presented a timely discussion on "Gas Turbines, Jet Propulsion and

Speaker John I. Yellott, whose jet propulsion talk drew a capacity audience to Chicago's Knickerbocker Hotel

Turbo-Chargers" at Feb. 13 meeting sponsored by the Section's Tractor group. Outlining essential characteristics of the equipment necessary to operate on this cycle, the speaker paid special attention to the General Electric design of the turbine supercharger as developed by Dr. Sanford A. Moss . . . He showed that for aircraft speeds above 500 mph, the jet system surpasses the conventional propellor drive in effectiveness, although the efficiency of each is undesirably low . . .

concluded on page 43

Student Branch News

THE *SAE Student Branch of California Institute of Technology* conducted a field trip to the plant of Vard, Inc., Pasadena, California, on Feb. 15. Company officials guided the students on a tour of inspection which included the production of milled and polished, engine-divided lucite scales for drafting machines. They watched lenses being ground, polished, and tested, and observed the process of coating lenses with extremely thin layers of metallic salts to cut down surface reflectivity.

Students also examined and rode models of an unusual light motorcycle which had among its interesting features a frame with integral shock absorbers and a single cylinder engine of 21 cu in. displacement. The engine, they discovered, makes use of sleeve bearings with a high-pressure lubrication system, in contrast to the conventional roller bearings and splash lubrication.

New officers have been elected by members of the Caltech SAE Branch. John E. Fleming has been voted chairman of the Branch, with James E. Densmore vice-chairman and Paul G. Bissiri, secretary-treasurer.

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At the Feb. 8 joint meeting of the *Purdue University SAE Branch* and ASME Branch Professor O. C. Cromer lectured on principles and operation of the gas turbine. The meeting program included the screening of two motion pictures, one entitled, "Gas Turbines," the other a War Department production entitled "Birth of the B-29."

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Principles, possibilities, and limitations of the helicopter were examined at the March 7 meeting of the *CCNY SAE Branch*. Allen Price, Platt-LePage Aircraft Co., presented motion pictures of the Platt-LePage helicopter in operation, and gave a running commentary in explaining the craft's performance.

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The *General Motors Institute SAE Student Branch* visited the AC Spark Plug, Fuel Pump Assembly, and Die Cast Departments on its field trip of Feb. 7.

Plan Full Representation

TAKING advantage of recent experiences with war-expanded technical work, SAE Council has made official the traditional SAE requirement that, in setting up technical committee personnel, all Society technical interests involved in the particular problem shall be represented.

This action, taken at the Jan. 12 meeting in Detroit, is designed to enable Council to assume that full discussion of all technical interests has taken place before submission to Council for final approval. The motion approved by Council read:

"It shall be required, in the establishment of working technical committees, that all SAE technical interests properly concerned shall have an opportunity to be adequately represented in the composition of the committee."

Glynn Reappointed

COUNCIL has approved the re-appointments of F. K. Glynn, engineer, American Telephone & Telegraph Co. as the SAE's representative and A. M. Wolf, automotive consultant, as alternate on the Mechanical Standards Committee of the American Standards Association for a two-year period beginning Jan. 1, 1945.

SUPERCHARGER ....
Drive Mechanisms Undergoing Tests

by DAVID GREGG
Bendix Aviation Corp.

▪ 1944 National West Coast Aeronautic Meeting

(Excerpts from paper entitled "Cabin Superchargers")

OF the 19 possible types of cabin supercharger drives which have been investigated, five merited more detailed study.

The first is a planetary transmission in which one element of the transmission is controlled by a hydraulic brake pump whose speed variations control the output speed of the supercharger.

The second unit is a hydraulic transmission, consisting of a variable-volume hydraulic pump and a fixed-volume hydraulic motor operating at pressures of about 3000 psi, the speed of the supercharger element being controlled by changes in the effective stroke of the hydraulic pump.

The third is a supercharger directly driven by a variable speed d-c motor obtaining its power from rectified a-c current. The fourth unit is a three-speed a-c motor directly driving a centrifugal supercharger, and the last unit is a standard auxiliary engine driving a centrifugal supercharger.

Of these five transmissions, the two which are considered immediately available based on present stages of development are the planetary transmission and the auxiliary engine. Fig. 1 illustrates a cross-section of a two-stage cabin supercharger consisting of a blower, variable speed transmission, hydraulic brake pump, supercharger regulator, and drive shaft.

For small aircraft or aircraft with relatively low air requirements, the Roots blower has proved ideally adapted. It is simple, lightweight, attaches directly to the main engine and is lubricated from it, delivers oil-free air and eliminates the need of an airflow control. In capacities ranging to about 6 lb of air per min, and maintaining cabin altitudes of 10,000 ft to airplane altitudes of 35,000 ft, its weight is approximately 35 lb, and only a simple cabin pressure control is necessary. The flow control is entirely eliminated as the blower is a positive-displacement type.

Based on present methods of construction, the Roots blower is an ideal cabin supercharger for cabins requiring up to 6 or 8 lb of air per min, and compression ratios of 3 to 1 with a single-stage blower and 9 to 1 with a two-stage blower. It is also possible, using multiple Roots blowers of different capacities or different speeds, to refrigerate the air by precompression stages, cooling the compressed air and utilizing the second Roots blower as an energy-absorbing source. This system can be operated as a refrigerating system for low altitudes, two-stage operation for extremely high altitudes, and parallel operation where lower cabin pressures or larger volumes of air are required.

The Roots blower may be used for turret supercharging, or in small electrically driven units, the supercharging of individual flying suits, radar harness, or the operation of photographic control equipment, as well as a source of oil-free air under either vacuum or pressure for various aircraft services.

With Roots blowers, controls usually consist of a simple cabin pressure valve which maintains the proper pressure within the cabin by restricting the flow of compressed air out of the cabin. If it is necessary to limit or regulate the flow produced by a Roots blower, a spill valve may be used.

The centrifugal blower requires a volume control or mass flow control in addition to the cabin pressure control. In a system of this type, the cabin control valve, by opening or closing the exhaust duct from

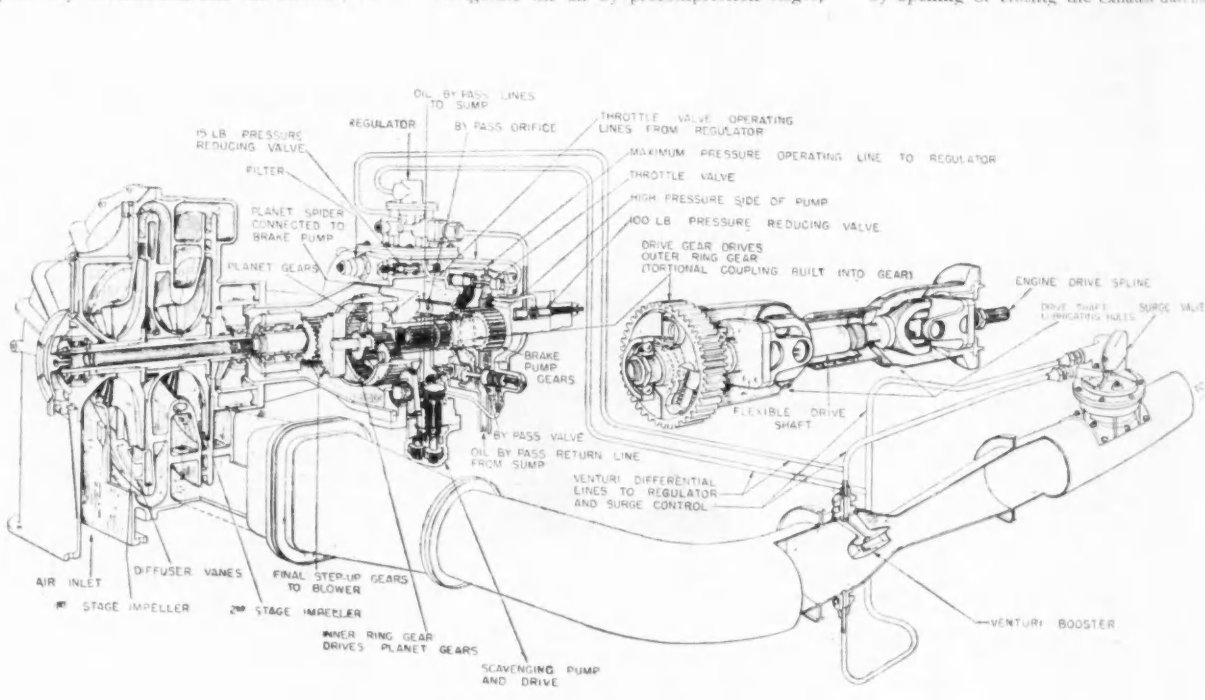

OIL BY-PASS LINES TO SUMP
REGULATOR
BY PASS ORIFICE
THROTTLE VALVE OPERATING LINES FROM REGULATOR
15 LB PRESSURE REDUCING VALVE
FILTER
MAXIMUM PRESSURE OPERATING LINE TO REGULATOR
THROTTLE VALVE
HIGH PRESSURE SIDE OF PUMP
100 LB PRESSURE REDUCING VALVE
PLANET SPIDER CONNECTED TO BRAKE PUMP
PLANET GEARS
DRIVE GEAR DRIVES OUTER RING GEAR (TORSIONAL COUPLING BUILT INTO GEAR)
ENGINE DRIVE SPLINE
BRAKE PUMP GEARS
FLEXIBLE DRIVE SHAFT
BY PASS VALVE
OIL BY PASS RETURN LINE FROM SUMP
VENTURI DIFFERENTIAL LINES TO REGULATOR AND SURGE CONTROL
AIR INLET
DIFFUSER VANES
FINAL STEP-UP GEARS TO BLOWER
1ST STAGE IMPELLER
2ND STAGE IMPELLER
INNER RING GEAR DRIVES PLANET GEARS
SCAVENGING PUMP AND DRIVE
VENTURI BOOSTER

Fig. 1 – Section of a cabin supercharger

for ENGINEERS

Given at SAE MEETINGS ★ ★ ★

Three Types of Airports Needed

by ARTHUR AYRES
Pan American World Airways

▪ 1945 War Engineering – Annual Meeting

Excerpts from paper entitled "Airports as Affected by Aircraft Performance and Weight")

IT is generally agreed by aeronautical and airport engineers that we must adopt at least three different types of airports to accommodate the various types of flying contemplated in the future, and that the size and type of construction required for these various airports can only be effectively determined by the performance characteristics and weight of the types of planes using the facilities.

Let us consider why the average airport which has already been built may undergo expansion and construction for a period of years following the war. Of the 2200-odd airports constructed in this country before and during the war, and an estimated 250-odd airports constructed by American forces in foreign countries during the war, it is estimated that only about 25% were designed around the California Load Bearing Test, which requires bases and wearing surfaces with enough strength to withstand 50,000-lb wheel loadings, or an airplane weighing about 100,000 lb.

Upon the advent of the B-29, the Army found it necessary to construct several specially designed airports. Other large projected aircraft are under construction, such as the Boeing 377, estimated gross weight of 130,000 lb; and the Douglas DC-7 with estimated gross of 162,000 lb. The question arises as to how many of these heavily constructed airports will be required and who will provide the funds.

Pan American Airways has been operating the Douglas DC-3 on many of its Latin American routes for the past few years, and proposes to use the DC-7 in this operation eventually. Let us compare weights and other figures pertinent to runway requirements:

	DC-3	DC-7
Gross weight, lb	25,200	162,000
Static load on each main wheel (max.), lb	11,650	76,800
Static load on tail or nose wheel (max.), lb	3200 (tail)	19,250 (nose)
Tire footprint pressure area, sq in.	49	85
Landing gear tread, in.	222	410

Comparison of these figures shows that over a period of about 10 years the weight of this proposed type of commercial airplane, the DC-7, has increased about six and one-half times over the present conventional type air carrier.

In addition to weight, another major factor in airport design is performance characteristics of various aircraft. A great step in the design of airplanes which will carry more pounds per horsepower and at the same time increase air speeds and decrease landing speeds is the airplane flap – which has saved huge costs in airport construction.

Let us compare as an example the performance of pre-war and present types of commercial airplanes, the DC-3 with the DC-7, post-war airplane which Pan American proposes to use for long-distance flights between the United States and international points:

	DC-3	DC-7
Landing speed, mph	70	85
Take-off speed, mph	97	104
Ground run to take off, ft	1500	2470
Payload, lb	6540	30,500
Take-off runway length (CAA), ft	3500	6640 (estimated)

These figures indicate that over a period of about 10 years a new proposed type of commercial airplane will require an increase in runway length of about 3000 ft.

In view of the prospective post-war airlines' competition, evidenced by the multitude of applications to parallel both existing domestic and international routes, it will probably be many years before any airline company becomes soundly established on a basis similar to railroad companies, and be in a position to make permanent investments in ground facilities which might later prove equitable.

However, there is a means of solving the problems of aircraft performance and weight as they affect airports, which is: designers of aircraft should form an association with designers of airports on an international basis, for the purpose of exchange of information. There is not at present a sufficiently extensive and intensive mutual exchange of data and plans. It is suggested, therefore, that all outstanding designers of aircraft, airport engineers of the airlines, Civil Aeronautics Authority, air carrier and airport officials, including qualified representatives of this type from other Allied countries, should be members of this association.

★ ★ ★

Air Cargo Promises Quicker Deliveries

by ALLEN DEAN
Detroit Board of Commerce

▪ 1944 National Air Cargo Meeting

(Excerpts from paper entitled "The Air Cargo Factor in Manufacturing")

AIR cargo's place in the manufacturing field will be the handling of many small hurry-up shipments for a lot of firms, rather than the handling of great quantities of business in regular heavy traffic movements.

Air cargo must wed economy to speed to make its greatest contribution to manufacturing. The lower the rates, the quicker the changeover from present transportation means. As the cost spread narrows, less

turn to p. 31

e cabin, maintains within the cabin the sured pressure.

With this type of blower it is necessary to have either a clutch mechanism by which he blower may be entirely disconnected om the engine drive, or a surge valve hich will automatically unload the blower nd permit circulation of air through the lower at any time when the engine speed reduced to a point such that the blower unable to build up enough pressure to eliver its rated mass flow of air into the abin. The characteristics produced by a onstant mass flow of air through a cali-rated venturi can be approached, and losely simulated by a simple barometric evice based on airplane altitude. This de-ice permits the maintenance of mass flow ithin limits of about ±10% while a ood venturi system will do about ±5% gainst a constant cabin pressure.

For satisfactory flight operation and ser-ice maintenance, it is absolutely essential hat the design of the supercharger, flexible rive, regulator, volume, and pressure con-rols, the lubricating system, and other de-ices pertaining to the cabin supercharger e one coordinated system; not an assembly f parts from separate manufacturers which he airplane builder attempts to coordinate nto a workable unit. With this limitation, atisfactory cabin superchargers are avail-ble for placing in immediate quantity pro-uction for post-war transports.

SAE Committees Advance Projects

Determination of environmental conditions under which aircraft electrical circuit breakers must perform in the present global operations being carried on by the air arms was undertaken at a meeting Jan. 18 and 19 of Subcommittee A-2A in Chicago. This is a joint project requested of the SAE by the Government, and coordinates the work and ideas of the National Aircraft Standards Committee, American Institute of Electrical Engineers, and the National Electrical Manufacturers Association. Seated (left to right): O. F. Olsen, Grumman Aircraft Engineering Corp.; E. G. Haven, General Electric Co., Chairman; J. B. Schifflin, Square D Co., and G. H. Compter, SAE Staff. Standing (left to right): R. A. Millermaster, Cutler-Hammer Co.; Major B. S. Spano, Working Committee of the A-N Aeronautical Board; V. G. Vaughan, Spencer Thermostat Co.; Lt. S. J. Mitchell, AAF, ATSC, and Warren Boughton, Chairman, NASC Electrical Radio and Instrument Installations Subcommittee

At its meeting Jan. 16, the Joint SAE Committee A-6, Aircraft Hydraulic Equipment, and the NASC Hydraulic Systems and Installation Subcommittee, reviewed problems leading toward the development of necessary industry and government standards and specifications. Seated (left to right): Howard Field, consulting engineer; B. N. Ashton, Electrol, Inc.; B. R. Teree, Airplane Division, Curtiss-Wright Corp., chairman; Jules P. Kovacs, Purolator Products, Inc., and Harry Kupiec, Air Associates, Inc. Standing (left to right): Glen Aron, Northrop Aircraft, Inc.; chairman, Western Division, National Aircraft Standards Committee; R. C. Bergh, Republic Aviation Corp.; J. T. Thompson, Glenn L. Martin Co., national chairman, National Aircraft Standards Committee; Frank Murphy, Douglas Aircraft Co., Inc.; W. C. Trautman, Bendix Aviation Corp.; F. O. Hosterman, Lockheed Aircraft Corp., and A. C. Newman, Chance-Vought Aircraft, Inc.

Deep appreciation was expressed to the members of the SAE Aircraft Accessories & Equipment Subdivision at its annual meeting on Feb. 7 in New York by Army and Navy spokesmen for its achievements in coordinating industry's opinions on standards and specifications with the needs of the military services for combat aircraft. The Subdivision, composed of the chairmen of the 13 subcommittees, is headed by William Littlewood, American Airlines, Inc., an SAE vice-president. Seated, in front of table (left to right): Charles Hollerith, vice-president, Hayes Industries, Inc.; E. W. Rentz, Jr., SAE Staff, and P. J. Kondla, Pratt & Whitney Aircraft. Seated behind the table (left to right): C. W. Pepperman, Lewis Engineering Co.; George H. Purcell, AAF Air Technical Service Command; John J. Hilt, vice-president, Young Radiator Co.; Lt. P. T. Gray, USNR; M. E. Chandler, vice-president, Chandler-Evans Corp.; C. V. Johnson, chief engineer, Bendix Products Division, Bendix Aviation Corp.; George H. Compter, SAE Staff; C. C. Shangraw, Eclipse Pioneer Division, Bendix Aviation Corp.; J. D. Redding, SAE Staff; Lt.-Col. G. R. Gaillard, AAF, and Com. E. C. Beck, USN, both members of the Working Committee of the A-N Aeronautical Board, and Chairman Littlewood. Standing: Wilford W. Davies, United Air Lines Transport Corp.; David Gregg, Eclipse Pioneer Division, Bendix Aviation Corp., and B. R. Teree, Curtiss-Wright Corp. Airplane Division. L. J. Henderson, Weatherhead Co., also attended the meeting.

SAE Coming Events

Baltimore – April 12

Engineers Club; dinner 8:00 p.m. Factors Affecting the Anti-Knock Performance of Post-War Gasolines – Thomas Harrison Risk, assistant director, Refinery Division, Research Laboratory, Ethyl Corp.

Buffalo – April 10 and May 1

April 10 – University Club; dinner 7:00 p.m. Speaker and subject to be announced.

May 1 – High Conductivity Cooling Fins for Aircraft Engines, James C. Cunningham, Wright Aeronautical Corp.; Single Cylinder High Altitude Cooling Tests, M. Piry, Ranger Aircraft Engines Division, Fairchild Engine & Airplane Corp.; Aircraft Spotwelding at Willow Run Bomber Plant, H. A. Mullen and L. Boelter, Ford Motor Co.; Aircraft Riveting and Equipment, Frank Dietrich, Curtiss-Wright Corp.; Structural Model Testing, O. W. Loudenslager, Goodyear Aircraft Corp.; Helicopters – W. Laurence LePage, Platt-LePage Aircraft Co.

Chicago – April 10

Knickerbocker Hotel; dinner 6:45 p.m. The Jeep – D. G. Roos, vice-president and chief engineer, Willys-Overland Motors, Inc. Motion Picture.

Cincinnati – April 23

Alms Hotel; dinner 6:30 p.m. Automotive Decision – J. M. Crawford, chief engineer, Chevrolet Division, General Motors Corp. and president, SAE. Guest – John A. C. Warner, secretary and general manager, SAE. Automotive Foundry Practice – Hiram Brown, Aluminum Industries Inc.

Cleveland – April 9

Cleveland Club; dinner 6:00 p.m. Tocco Hardening Process – Harry B. Osborne, Jr., research director, Tocco Division, Ohio Crankshaft Co.

Colorado Group – April 17

Kaiser Industries Inc.; meeting 8:00 p.m. Trip through Kaiser Industries Inc.

Dayton – April 24

Protection of Electrical Systems on Military Aircraft, Capt. R. J. Lusk, Engineering Division, Air Technical Service Command; Aircraft Accessories for 400-Cycle Motor Operation, Ray G. Holt, Pesco Products Co.; Performance of the Air-Oil Separator in Engine Breather Systems, Lowell Edwards, Thompson Products, Inc.; Aircraft Power-Plant Vibration Problems, John Tyler, Pratt & Whitney Aircraft Division, United Aircraft Corp.; Coffee Speaker – SAE President J. M. Crawford; The Mechanics of the Manufacture of Aviation Gasoline, Lester Steffens, Socony-Vacuum Oil Co.

Detroit – April 2 and May 7

April 2 – Horace H. Rackham Educational Memorial Bldg.; dinner 6:30 p.m. Air Transport Operations – Present and Future – Otto E. Kirchner, director of aircraft engineering, American Airlines, Inc. The Future of Aviation in Detroit – Glenn C. Richards, commissioner, Department of Public Works, City of Detroit.

May 7 – Aircraft Engine Gears, F. R. McFarland, Packard Motor Car Co.; Silver Bearings, E. B. Etchells and Arthur Underwood, General Motors Research Laboratories; Symposium – Evaluation of Axial versus Centrifugal Superchargers – Axial versus Centrifugal Superchargers for Aircraft Engines, W. J. King, General Electric Co.; Some Advantages and Limitations of Centrifugal and Axial Aircraft Compressors, Kenneth Campbell and John E. Talbert, Wright Aeronautical Corp.; Symposium – The Light Airplane – Service Experiences with Light Aircraft Engines, R. D. Hicks, Continental Motors Corp.; The Post-War Market for Personal Planes, R. A. Robinson, Crowell-Collier Publishing Co.; Operating Cost of Light Aircraft, John Friedlander, Aeronca Aircraft Corp.; A Resume of Desirable Characteristics for Non-Stalling Non-Spinning Airplanes, R. B. Maloy, Civil Aeronautics Administration; Automotive Decision, SAE President J. M. Crawford, speaker.

Indiana – April 12

Antlers Hotel, Indianapolis; dinner 6:45 p.m. Detonation Indicating Equipment Used by Allison Division of the General Motors Corp. – John R. Whitmore and John R. Burns, Allison Division, General Motors Corp. Paper illustrated with slides and charts.

Kansas City – April 4

Continental Hotel; dinner 6:30 p.m. Engineering Problems of Aero Threads and Heli-Coil Thread Systems – G. C. Brown, project engineer, Aircraft Screw Product Co.

Metropolitan – April 5 and April 12

April 5 – Propeller Balance Problems, S. G. Best, Hamilton Standard Propeller Division, United Aircraft Corp.; A Study in the Developments of Automatic and Controllable Propellers for the Light Plane, John D. Waugh, Propeller Division, Curtiss-Wright Corp.; Symposium on Fuels: Aviation Fuels – What the Airlines *Want* and *Expect*, G. K. Brower, American Airlines, Inc.; The Valuation of Better Fuels, E. A. Ryder, Pratt & Whitney Aircraft Division, United Aircraft Corp.; Aircraft Fuels of the Future, A Supplier's Preview, R. T. Goodwin, Shell Oil Co., Inc.; A Trip to the Pacific Theater, P. B. Taylor, Wright Aeronautical Corp.; Alfred Marchev, toastmaster.

April 12 – Pennsylvania Hotel, New York; meeting 8:00 p.m. The Application of the Turbo-Supercharger to the Aircraft Engine and the Transport Airplane – Frank W. Disch, power-plant engineer, Boeing Aircraft Co., and Paul Bancel, test engineer, Wright Aeronautical Corp.

Mid-Continent – April 6

Mayo Hotel, Tulsa; meeting 7:30 p.m. Methods for Testing Cutting Oils – H. L. Moir, assistant chief products engineer, Pure Oil Co.

Milwaukee – April 6

Milwaukee Athletic Club; dinner 6:30 p.m. Radar and Electronics in Automotive Industry. Speaker to be announced.

New England – April 2

Engineers Club, Boston; dinner 6:00 p.m. Automotive Decision – J. M. Crawford, chief engineer, Chevrolet Division, General Motors Corp., and president, SAE. Guest – John A. C. Warner, secretary and general manager, SAE.

Oregon – April 6

Imperial Hotel; dinner 7:30 p.m. Gasoline Injection – Harry O. Hill, engineer, Gasoline Injection, American Bosch Corp.

Peoria – April 23

Jefferson Hotel; dinner 6:30 p.m. Motor Truck Maintenance – H. H. Strawn, supervisor of branch and fleet owner service, International Harvester Co.

Philadelphia – April 11

Engineers Club; dinner 6:45 p.m. Jet Propulsion – Ben Hamlin. Motion Picture.

Pittsburgh – April 10

Mellon Institute; dinner 6:30 p.m. Porous Chrome Plated Rings and Cylinders and Their Applications – Dr. T. C. Jarrett, chief metallurgist, American Hammered Piston Ring Division, Koppers Co. This meeting originally scheduled for March 27.

Salt Lake Group – April 9 and 12

April 9 – Newhouse Hotel; meeting 7:30 p.m. Preventive Maintenance – A Necessity – E. B. Ogden, assistant superintendent of maintenance, Pacific Intermountain Express Co. Motion Pictures.

April 12 – Newhouse Hotel; meeting 7:30 p.m. Engine Bearings – R. A. Watson, factory manager, Federal Mogul Corp.

Southern California – April 5 and 19

April 5 – Ambassador Hotel, Los Angeles; meeting 7:30 p.m. Diesel Engines – H. L. Knudsen, vice-president in charge of engineering, Cummins Engine Co., Inc.

April 19 – Hollywood Roosevelt Hotel, Los Angeles; dinner 6:30 p.m. Aircraft Accessories. Speaker to be announced.

Southern New England – April 3

Bond Hotel, Hartford; dinner 6:45 p.m. Automotive Decision – J. M. Crawford, chief engineer, Chevrolet Division, General Motors Corp., and president, SAE. Guest – John A. C. Warner, secretary and general manager, SAE.

Spokane Group – April 13

Spokane Hotel; dinner 7:00 p.m. Cold Welding – William B. Keith, Jones White Truck Co.

Texas – April 20

Baker Hotel, Dallas; dinner 6:30 p.m. Speaker and subject to be announced.

Twin City Group – April 12

Curtis Hotel, Minneapolis; dinner 6:30 p.m. The Post-War Bus – W. I. Rodgers, assistant to chief engineer, Mack Mfg. Corp.

Washington – April 10

Statler Hotel; dinner 7:00 p.m. Helicopters – Professor Nikolsky, Princeton University.

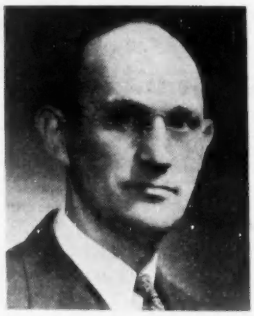
Western Michigan – April 19

Occidental Hotel, Muskegon; dinner 6:30 p.m. Aircraft and War Activity. Speaker to be announced.

Wichita – April 19

Droll's English Grill; buffet luncheon 7:00 p.m. Diesel Power for Railway – Automotive and Aircraft Use. Diesel Fuels. Speakers to be announced.

CGB Chief Engineer



Max M. Roensch, who had been staff engineer for Chrysler Corp. for the past 19 years, has been appointed chief engineer of Cleveland Graphite Bronze Co. Widely known in the automotive and petroleum industries as an authority on internal-combustion engines, as well as an author of numerous scientific papers which he presented before engineering and technical groups, Mr. Roensch is also active in Society affairs. He is currently serving as a member of the SAE Diesel Engine Activity Committee and SAE Fuels & Lubricants Activity Committee

A. W. F. GREEN, previously chief metallurgist, Pratt & Whitney Aircraft Corp. of Mo., Kansas City, Mo., has joined Allison Division, GMC, Plant 2, Indianapolis, in the same capacity. He is chairman of the SAE Aircraft Accessory Materials & Processes Coordinating Subdivision.

MARVIN J. PARKS is now connected with Fairchild Engine & Airplane Co., Aircraft Division, Hagerstown, Md. He had been assistant director of contracts in charge of transports, Curtiss-Wright Corp., Plant 2, Buffalo, N. Y.

Formerly development and research engineer, James H. Knapp Co., Inc., Los Angeles. **EARL A. STOUT** is now in the U. S. Army, Company K, 166th Infantry, Fort Sill, Okla.

GEOFFREY C. HAZARD, formerly technical manager, Socony-Vacuum Oil Co., Inc., St. Louis, Mo., is now with the Technical Division of the company's New York branch.

Formerly assistant manager, sales order and service department, Weatherhead Co., Cleveland, **WALTER J. BRAUER** is now connected with the Virtoreen Instrument Co., same city.

EDWARD A. SIPP, previously general sales manager, Guardian Electric Mfg. Co., Chicago, is now doing special engineering and sales promotion work for Gustin-Bacon Mfg. Co., same city. Mr. Sipp is a past-chairman of the SAE Chicago Section.

ROY T. ADOLPHSON, a captain in the U. S. Army, has been transferred from Camp Gruber, Okla., to the Detachment of Patients' Hospital, Camp J. T. Robinson, Arkansas.

J. W. DONNELL, who had been professor of petroleum engineering, University of Oklahoma, Norman, Okla., is now vice-president in charge of production, Industrial Lining Engineers, Inc., Edgeworth, Pa.

ARTHUR H. HERTS is now the owner of Arthur Herts & Associates, production engineers, New York City. He had been general manager, Automatic Production Tool Engineers, Inc., Chicago.

CHARLES W. MUSSER has joined Senn Corp., Danville, Ill., as factory manager. He was formerly chief engineer, Chicago plant, Allied Control Co., Inc., Chicago.

DANIEL M. ADAMS, formerly with Cadillac Motor Car Division, GMC, Detroit, doing automotive sheet metal design work, is now a lieutenant in the U. S. Army, stationed at Pampa Army Air Field, Pampa, Tex.

JOHN H. STANG, mechanical engineer and former assistant in the mechanical engineering department of Ohio State University, has been appointed to the staff of Battelle Memorial Institute, Columbus, Ohio, and assigned to its Division of Fuels & Research.

D. O. Thomas, president of Bendix-Westinghouse Automotive Air Brake Co. and vice-president of Bendix Aviation Corp., has relinquished his latter duties to devote full time to the affairs of Bendix-Westinghouse of Elyria, Ohio, as its chief executive officer

Malcolm P. Ferguson, vice-president and group executive of Bendix Aviation Corp., has been elected a member of the company's board of directors. He has been an officer of the organization since 1942

About Co

THOMAS W. FLOOD has been elected vice-president of Electric Auto-Lite Co. in charge of original equipment sales in Auto-Lite's 22 plants throughout the United States and Canada. Mr. Flood was formerly assistant original equipment sales manager of the Toledo branch.

CLAY BALLINGER has left American Bantam Car Co., Butler, Pa., where he was factory manager, to accept a position with Darling Valve & Mfg. Co., Williamsport, Pa., as plant manager.

CAPT. JAMES D. MOONEY, who has been released from active duty by the U. S. Navy, has returned to General Motors Corp. to resume his duties as vice-president, group executive of the overseas operations of the

Capt. James D. Mooney

company, as a member of the Administration Committee, and a member of the board of directors. Capt. Mooney had been serving on the staff of the Chief of Naval Operations before re-entering civilian life.

JOSEPH E. KRUSE, who is now in the U. S. Navy, was formerly chief time study engineer, Johnston & Jennings Co., Cleveland. He is now connected with the Office of Navy Cost Inspector, Anchor Optical Corp., New York City.

W. J. RALEIGH is no longer head of the Engine Design Section, National Advisory Committee for Aeronautics, Cleveland, having joined Scott-Atwater Mfg. Co., Minneapolis, as design engineer in charge of design and development of outboard motor magnetos.

ROBERT MOTION, formerly branch manager of West India Oil Co., S. A., Dominican Republic, West Indies, now has the same position with Esso Standard Oil, S. A., same city.

JOHN A. ROBINSON, Buick Motor Division, GMC, Flint, Mich., has been raised from a checker in the engineering department to assistant chief draftsman.

SAE Members . . .

GEORGE C. McMULLEN has been appointed assistant to the president, and vice-president in charge of product research and development, Tyson Bearing Corp., Massillon, Ohio. Mr. McMullen had been vice-president in charge of industrial sales of the company.

Formerly service engineer, Kenworth Motor Truck Corp., Seattle, Wash., **EDWARD BEEZER** is now manager for Motor Power Equipment Co., Billings, Mont.

ROBERT CASS has been promoted from chief engineer to assistant to the president of White Motor Co., Cleveland. In his new capacity Mr. Cass will be in close contact with engineering management, and will be particularly active in the field, where he will study markets from an engineering point of view. He now serves as secretary of the SAE Cleveland Section.

Robert Cass

CHARLES H. MILLER, who had been branch service manager for White Motor Co. in Philadelphia, is now export service manager for the same company in Cleveland. Mr. Miller is a past-chairman of the SAE Cleveland Section.

R. E. COOK, plant manager for A. O. Smith Corp., has been transferred from Milwaukee to St. Paul, Minn.

B. A. GILLIES has been appointed assistant to the president and director of flight and service of Ryan Aeronautical Co., San Diego, Calif. Mr. Gillies had been vice-president of Grumman Aircraft Engineering Corp., Bethpage, L. I., N. Y., for the past 10 years.

JAMES WALLACE SMELKER, a recent graduate of Ohio State University, has been named to the staff of Battelle Memorial Institute, Columbus, Ohio, assigned to the Division of Fuels Research.

MAJOR CHARLES W. MILLS, JR., U. S. Army, has been transferred from Camp Haan, Calif., to the Stockton Ordnance Base, Stockton, Calif.

B-29 Designer Honored

Edward C. Wells (right), chief engineer of Boeing Aircraft Co., is shown being congratulated by Secretary of the Treasury Henry A. Morgenthau on winning the Fawcett Aviation Award of $1000, presented annually by Fawcett Publications. Mr. Wells received the award for his work in advancing long-distance flight, as embodied in the B-17, B-29, and the Army's C-97

A. G. WITTERS, who had been assistant shop equipment engineer, Wright Aeronautical Corp., Lockland, Ohio, is now assistant plant engineer, Lever Bros. Co., Baltimore, Md.

SILVIO J. BALESTRINI, who is in the U. S. Army, has moved from Camp Shelby, Miss., to the Atlanta Ordnance Depot, Atlanta, Ga.

LT. VINCENT J. BONINA, U. S. Army Air Forces, may be reached at Amarillo, Tex. He had been at the Officers Mail Section, Gulfport, Miss.

FRANCIS R. CROSS, formerly carburetor engineer, Owosso Division, Bendix Aviation Corp., Owosso, Mich., is now layout draftsman, Menasco Mfg. Co., Burbank, Calif.

THOMAS S. ASHLEY is now managing editor of Air Review Publishing Corp., Dallas, Tex. He had been editor of *Southern Flight,* same city.

Previously vice-president and general manager, Twin Coach Co., Kent, Ohio, **PAUL H. BREHM** is now with General Metals Powder Co., Akron, Ohio, in the same capacity.

JOHN B. COLE has joined Westfield Mfg. Co., River Rouge, Mich., as general foreman. He had been connected with Universal Products Co., Inc., Dearborn, Mich., as a superintendent.

RICHARD SIMONSEN, previously a lieutenant colonel with the Western Command, Australian Military Forces, Headquarters, Swan Barracks, Perth, Western Australia, has returned to Mason & Simonsen, Ltd., same city, as managing director.

CHARLES C. MERZ is now a consulting engineer with offices in New Augusta, Ind. He had been president of Merz Engineering Co., Indianapolis.

W. T. NICKEL, previously installation engineer, Allison Division, GMC, Indianapolis, has joined the engineering department of Rochester Products Division, GMC, Rochester, N. Y., where he is project engineer.

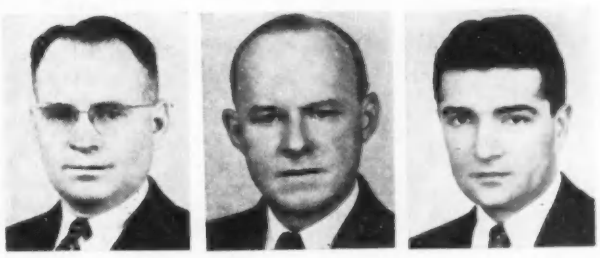
FRANK E. WATTS, formerly liaison representative, Conversion Industrial Division, Office of the Chief of Ordnance, is now development engineer, Ingersoll Steel & Disc Division, Borg-Warner Corp., Kalamazoo, Mich.

JOSEPH W. FRAZER, chairman of the board of Graham-Paige Motors, Inc., has been appointed chairman of the judges' committee of the National Peace Treaty Contest, which is designed to give every American an opportunity to write a practical peace treaty which can be applied to the world at the end of the war. Total prizes to be awarded will be $10,000 in war bonds.

LeROY YATES POND has moved from the U. S. Naval Air Station, Corpus Christi,

Allison Division Promotions

Roy E. Lynch | J. C. Fetters | Dimitrius Gerdan



SAE men raised by Allison are ROY E. LYNCH, from assistant to the chief engineer to executive engineer; J. C. FETTERS, from engine development engineer to chief turbine engineer; and DIMITRIUS GERDAN, from chief installation engineer to chief engine engineer

Tex., where he was general foreman, to the one at Dallas, Tex., where he is senior inspector of engine overhaul and test.

SAE members who have received recent promotions within the Armed Forces include: **WILLIAM K. BENNETT,** Ordnance Department, Camp Kilmer, N. J., and **GARLAND C. RICHARDSON,** Office of the Chief of Ordnance – Detroit, to major; **ROBERT L. DOUGLAS,** A. P. O. 339, c/o Postmaster, N. Y., and **G. D. SHAMBROOK,** A. P. O. 235, c/o Postmaster, San Francisco, to captaincy; and **FRANK M. AULD,** Camp Shilo, Manitoba, Canada, to lieutenant.

Among SAE Members to receive awards from the Institute of the Aeronautical Sciences on Wednesday, Jan. 31, were the following: **DR. EDWARD WARNER,** vice-chairman of the Civil Aeronautics Board, and **SIR FREDERICK HANDLEY PAGE,** managing director, Handley Page, Ltd., who received the two principal awards, the annual honorary fellowships; and **FRED E. WEICK,** chief engineer, Engineering & Research Corp., who received the Sylvanus Albert Reed Award for a contribution to aeronautical science.

SAE Members granted fellowships in the Institute were: **PAUL S. BAKER,** Chance Vought Aircraft Division, United Aircraft Corp.; **CHARLES FROESCH,** chief engineer, Eastern Air Lines, Inc.; **ALEXANDER KARTVELI,** chief engineer, Republic Aviation Corp.; **OTTO E. KIRCHNER,** chief engineer, American Airlines, Inc.; and **ERLE MARTIN,** engineering manager, Hamilton Standard Propellers, Division United Aircraft Corp.

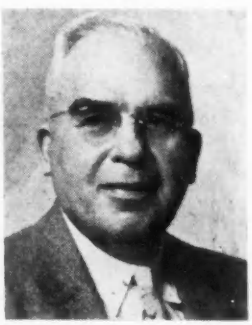
SAE Member **MAJOR LESTER D. GARDNER,** chairman of the Institute's Council, announced that sufficient gifts had been received to assure the erection of its own buildings in New York, Los Angeles, and San Diego as soon as war restrictions on building were removed.

The meeting was presided over by **R. H. FLEET,** retiring president of the Institute, and also an SAE Member.

ELMER S. CROCKER has joined the Los Angeles Board of Education as vocational coordinator. He had been an instructor for Wiggins Trade School, Los Angeles.

OTTO J. DOEPEL, who is connected with the U. S. Army Ordnance Department, has moved from the Detroit district, where he was engineer and production specialist, to the Birmingham (Ala.) district, where he is an industrial engineer.

Otto J. Doepel



Tom O. Duggan

TOM O. DUGGAN, a vice-president of Thompson Products, Inc., Cleveland, has arrived in Europe to serve the U. S. Armed Forces as an automotive parts expert. Working for the War Department as a uniformed civilian, Mr. Duggan will initiate the manufacture in Europe of replacement parts for U. S. mechanized equipment in war zones.

R. TOM SAWYER, engineer, diesel equipment, American Locomotive Co., has, in his illustrated book, "The Modern Gas Turbine," published by Prentice-Hall, Inc., New York City, given a clear, thorough explanation of the fundamental principles of gas turbine operation, as well as a graphic description of inventions and recent developments covering industrial, marine, railroad, and aeronautical applications of gas turbines. Mr. Sawyer enlivens his discussion of the gas turbine's uses as an exhaust turbosupercharger in all fields of service, including jet propulsion, by accompanying it with 131 line drawings, halftones, and blueprints. The book is an up-to-date and comprehensive study of the subject for executives and practicing engineers.

JOSEPH O. HOPPER, who had been shop superintendent, United Geophysical Co., Pasadena, Calif., is now connected with Republic Supply Co., Machinery Division, as assistant production manager.

Previously chief engineer, Air Cargo Division, Harvey Machine Co., Inc., Los Angeles, **LLOYD STEARMAN** is now vice-president of Stearman Engineering Co., Dos Palos, Calif.

LOGAN B. HELM is now superintendent of the manufacturing department of Continental Refining Co., Oil City, Pa. He had been superintendent of the manufacturing department, Standard Oil Co. of Ohio, Cleveland.

EUGENE R. PRITCHARD has resigned his position with the British Army Staff, British Ministry of Supply Mission in Washington, to join the Office of the Quartermaster General, U. S. Army, as automotive engineer with headquarters in Chicago.

A. P. FONTAINE is now with Bendix Aviation Corp., Detroit, as director of aircraft development. He had been assistant to the director of engineering, Consolidated Vultee Aircraft Corp., Vultee Field, Calif.

HAROLD M. BURDICK is no longer associated with Sperry Gyroscope Co., Research Laboratory, Garden City, L. I., N. Y., as layout draftsman, having joined International Business Machines Corp., Endicott, N. Y., as a designer.

ROBERT T. DeNORMANDIE, former liaison engineer, Pullman Standard Division, Chicago, is now serving with U. S. Naval Air Training Center, Okla.

LOUIS POLK, president of Corp., Dayton, Ohio, has recently awarded the Gold Medal of the Army nance Association. Mr. Polk received award for "outstanding service to Ordnance."

ROBERT T. HASLAM, vice-president general sales manager, Standard Oil Co. N. J., addressed the annual Lincoln dinner of the Chamber of Commerce N. J. Mr. Haslam has written a book titled, "Fuels and Combustion," and is of the co-authors of "Britain's Fuel Problems."

JAMES H. FOOTE, JR., formerly tant project engineer, Holley Carburetor Detroit, is now an ensign in the U. S. stationed at the Naval Air Material Philadelphia.

NORMAN E. COOK, who had been manager of his own business in Detroit, now connected with Warren Screw Co., Newport, Mich.

PROF. MILTON J. THOMPSON, ously with the department of aeronautical engineering, University of Texas, has been granted a leave of absence to engage in war research project of the U. S. Navy.

Formerly project engineer, Continental Motors Corp., Muskegon, Mich., **LLOYD R. SCHUBERT** is now connected with Air-Maze Corp., Detroit.

MAJOR GERALD C. DUNBAR, U. S. Army, has been transferred from Fort Jackson, S. C., to A. P. O. 18457, c/o Postmaster, New York City.

MAJOR EDWARD H. W. PARTRIDGE, formerly connected with India Stores Department, Blackpool, Lancaster, England, is now technical engineer for Maudslay Motor Co., Warwickshire, England.

GEORGE A. DELANEY, previously supervisor of mechanical and electrical equipment, Aircraft Section, Fisher Body Division, GMC, Detroit, is now assistant chief engineer, Pontiac Motor Division, GMC, Pontiac, Mich. Mr. Delaney is a past-chairman of the SAE Detroit Section and was chairman of the SAE Sections Committee in 1942-43.

ROBERT W. MINER has left his position as project engineer, Chrysler Corp., to become affiliated with Sparks-Withington Co., Jackson, Mich., as product engineer. His father, **ROBERT I. MINER,** retains his post as chief engineer of Ryerson & Haynes, Inc., Jackson, Mich., although it was erroneously stated in the February issue of the **SAE Journal** that he had left that company to join Sparks-Withington.

JOHN W. HOSPERS, who is in the U. S. Navy, has been transferred from the training center in Bainbridge, Md., to the Naval Training School, Del Monte, Calif.

ENSIGN RUSSELL D. LIBERT, U. S. Navy, may be reached at the U. S. Naval Repair Base, San Diego, Calif. He had been junior engineer, Military & Light Aircraft Carburetor Division, Bendix Aviation Corp., South Bend, Ind.

E. S. EVANS, who was formerly head ...el and lubricant engineer for the Portland ...trict of Standard Oil Co. of Calif., is now ...les promotion executive, California Com...cial Corp., New York City. His unex...ired term as vice-chairman of the SAE ...regon Section will be filled by **WILLIAM ...UNNENKAMP.**

W. A. SAUNDERS has resigned his po...on as mileage rationing expert of the ...ffice of Price Administration to become ...ield engineer with Petroleum Solvents ...orp., New York City. Mr. Saunders, ...hose unexpired term as treasurer of the ...AE Oregon Section will be completed by ...W. G. AUER, will maintain headquarters ...n San Francisco.

DAVID U. HUNTER, previously senior ...ress analyst, Wright Aeronautical Corp., ...aterson, N. J., is now research engineer, ...Elliott Co., Jeannette, Pa.

DONALD S. MACDONALD, a first lieu...nant in the U. S. Army Chemical Warfare ...ervice, has been transferred from Pine ...Bluff Arsenal, Ark., to the Civil Affairs ...Training School, Harvard University, Cam...bridge, Mass.

A. MACKMANN, who resigned as vice-...president in charge of development and re...search, Foote Bros. Gear & Machine Corp., ...Chicago, has entered into business for him...self, and may be contacted at A. Mackmann ...Tool & Engine Co., same city.

CAPT. WILLIAM F. WILLIAMS, U. S. ...Army, has moved from Camp San Luis ...Obispo, Calif., and may now be reached at ...A.P.O. 450, c/o Postmaster, New York ...City.

When more than one member of the So...ciety has the same name, editors of the ***SAE Journal*** are walking along a precipice ...when writing about either one. We exceed...ingly regret to report that we fell over it in ...the September issue by publishing the obit...uary of **THOMAS J. HALL,** engineer, ...Charles E. Smith Co., instead of **THOMAS ...JOHN HALL,** service engineer, American ...Bosch Corp. Thomas J. Hall, we are glad ...to say, is very much alive. Our sincerest ...apologies to you, Mr. Hall.

WALLACE F. ARDUSSI has been elected ...vice-president of Hupp Motor Car Corp., ...directing the company's sales organizations ...both at the Globe Stamping Division, Cleve...land, and the Hupp Machining Division, ...Detroit. Mr. Ardussi was formerly manager ...of the Aircraft Devices Division, Foote Bros. ...Gear & Machine Corp., Chicago.

Wallace F. Ardussi

Named to Development Post

Ralph S. White, former chief of the powerplant section of the Civil Aeronautics Authority, has been appointed manager of engineering development, Ranger Aircraft Engines, Division Fairchild Engine & Airplane Corp. Mr. White recently returned from England where he had served two years as a lieutenant colonel in the U. S. Army Air Forces

JOHN L. PARKS, who had been development service engineer, Briggs Clarifier Co., Washington, D. C., is now affiliated with Associated Transport, Inc., Baltimore, Md.

J. R. MOHLIE, Oliver Corp., Battle Creek, Mich., has been promoted from chief engineer to plant manager of the organization.

J. R. Mohlie

CAPT. MILLARD J. HOLBROOK, who is in the Ordnance Department of the **U. S.** Army, has been transferred from Yale University, New Haven, Conn., where he was in the 3510th AAF Base Unit, to the 3507th AAF Base Unit, Sioux Falls Army Air Field, Sioux Falls, S. D.

F. W. HECKERT, formerly vice-president of Curtis Pump Co., Dayton, Ohio, is now connected with Thompson Products, Inc., as field engineer.

WILLIAM J. CLARK has been appointed to the production office of Detrex Corp., Detroit. He had been student engineer, Detroit Diesel Engine Division, General Motors Corp.

LT. ORVILLE L. ADAMS, SR., U. S. Navy, has moved from the Naval Operations Base, Kodiak, Alaska, and may now be reached at the Navy Department, Washington, D. C.

Previously production engineer, Empire Electric Brake Co., Newark, N. J., **RUDOLPH J. KLIMKIEWICZ** is now with Maurice A. Lichten Co., Orange, N. J., in an engineering capacity.

JAMES C. SWEGER, formerly industrial engineer, Thompson Products, Inc., Cleveland, is now in the U. S. Army, stationed at Fort Benning, Ga.

CAPT. WILLIAM J. LONG, JR., U. S. Army Ordnance Department, has been transferred from overseas service in the Central Pacific area to the Ordnance Automotive School, Mount Rainier Ordnance Depot, Tacoma, Wash.

MURRAY F. CROSSETTE, JR. is now staff assistant to the manager of the Order and Contract Division, Wright Aeronautical Corp., Plant 1, Paterson, N. J. He had been technical representative for Wright, serving overseas with the Fifth Air Force.

DENNIS LIU, formerly doing experimental and research work, Waukesha Motor Co., Waukesha, Wis., is now with the Chinese Supply Commission, Washington, D. C.

F. S. JONES may now be contacted c/o Black Drill Co., Cleveland, Ohio. He had been research engineer, Haynes Stellite Co., Kokomo, Ind.

CHARLES CUMA, who had been in the engineering department of Atlas Imperial Diesel Engine Co., Chicago, is now connected with Willys-Overland Motors, Inc., Toledo, Ohio, as design engineer.

HAROLD M. HART is no longer project engineer, Continental Motors Corp., Detroit, having joined Industrial Specialties Co., same city.

A former student of the College of the City of New York, **SEYMOUR LIEBLEIN** is now a mechanical engineer, Aircraft Engine Research Laboratories, National Advisory Committee for Aeronautics, Cleveland.

COL. FREDERICK C. HORNER has been named a consultant on highway transportation in the Stockpiling & Transportation Division of the War Production Board. Col. Horner, now on inactive status in the Army of the United States, left General Motors Corp. shortly after Pearl Harbor to organize and operate the Highway Division, Transportation Corps, Army Service Forces.

Previously chief engineer, Sun Mfg. Co., Chicago, **V. L. WESTBERG** now has his own business, Westberg Mfg. Co., same city.

CHILDRESS B. GWYN, JR., formerly chief engineer and general manager, Allied Control Co., Inc., Chicago, is now engineering, technical and manufacturing manager, Tungsten & Powder Metal Divisions, H. A. Wilson Co., Newark, N. J.

SAE members who have received recent changes in company status include: **C. WILLIAM SIDWELL,** Bell Aircraft Corp., from pump equipment engineer in Buffalo, N. Y., to powerplant aerodynamicist in the Virginia Falls, N. Y., plant; **L. B. SLONEKER,** truck, bus and tractor tire salesman and engineer, Firestone Tire & Rubber Co., has been transferred from the New Orleans to the Oklahoma City office; **DALE C. ROST, SR.,** United Aircraft Products, Inc., Los Angeles, from production engineer to assistant chief engineer; **HAROLD F. SCHWEDES,** North American Aviation, Inc., from factory manager in Grand Prairie, Tex., to assistant to the manufacturing manager, Inglewood, Calif.; and **E. E. HAMILTON,** Fisher Body Division, GMC, Detroit, from special assignment engineer to master mechanic.

Also, **A. LAMONT FARNSWORTH,** Air Reduction Sales Co., from assistant motor truck supervisor, New York City, to assistant to the supervisor of motor truck equipment in the Chicago office.

JEAN-PAUL LEVI, chairman of the French Colonial Supply Mission, New York, has been elected to the board of the French Latil Co., a major manufacturer of trucks and tractors in that country. Recently the Nazi-controlled "occupational management" was dissolved, and the company has been returned to its former owners.

THOMAS H. HARDGROVE, field service engineer, Sperry Gyroscope Co., has transferred from the Brooklyn, N. Y., plant to the one in San Diego, Calif.

Formerly stationed at Fort Ord, Calif., **LT. JOHN A. WATKINS** is now in India serving as Ordnance Officer, Heavy Auto Maintenance.

JOHN F. CAMPBELL, formerly chief engineer, Fuel Injection Department, Holley Carburetor Co., Detroit, is now development engineer, gas turbine equipment, Weatherhead Co., Cleveland.

Previously chief engineer, Mechanical Sales Division, Marine Section, U. S. Rubber Co., Detroit, **HUBBARD WILLIAM STEINER,** now holds the position of plant manager, Aetna Rubber Co., Cleveland.

FRANK D. ST. HILAIRE, who had been technical representative, Wright Aeronautical Corp., Paterson, N. J., is now serving in a technical capacity for Wright Aero Ltd., Los Angeles, Calif., a subsidiary of Wright Aeronautical Corp.

WILLIAM J. CARRY has been promoted from the rank of lieutenant commander to commander, and is now stationed in Washington, D. C.

MAJOR ALEC A. SMITH, who had been serving in Italy as chief technical officer for No. 8 South African Fighter Wing, has been released from the South African Air Force to resume his activities with the South African Airlines as assistant chief inspector.

G. O. NOVILLE, executive vice-president, Airport Facilities Corp. of Calif., and **JEROME LEDERER,** aviation consultant, Aero Insurance Underwriters, are serving on the newly organized Airports Committee of the Aviation Section, N. Y. Board of Trade. As part of the first meeting program a forum will be conducted on the provisions of various bills now in Congress pertaining to airports.

Formerly officer in charge, Specifications & Drafting Section, Fort Monmouth, N. J., **LT. ROBERT C. HENN** is now O/C Procurement Data Branch, Long Branch, N. J.

A. E. WILSON, formerly chassis engineer, White Motor Co., Cleveland, has been appointed assistant sales manager of the Automotive Division of Pesco Products Co., same city. Mr. Wilson is a member of SAE Cleveland Section's governing board as well as a member of the SAE Bus Tire Subcommittee.

CHESTER E. MINES recently joined Packard Motor Car Co., Aircraft Engine Division, Toledo, Ohio. He was previously chief engineer, Jacobs Aircraft Engine Co., Pottstown, Pa.

JAMES W. BILLINGS, JR., formerly major, attached to the Ninth Air Force Service Command, has been promoted to the rank of lieutenant colonel. He may be reached at Headquarters, 42nd Air Depot Group, Ordnance Section, A.P.O. 149, Postmaster, New York City.

Formerly assistant project engineer, Wright Aeronautical Corp., Paterson, N. J., **JOHN D. ROGERS, JR.,** is now associated with California Research Corp., Standard Oil Co. of Calif., Richmond, as research engineer, Fuel Research Engine Laboratory.

Formerly at Lawrence Institute of Technology, **YOSHIO R. KONO** is now serving in the U. S. Army and is stationed at Camp Robinson, Ark.

VICTOR G. RAVIOLO, previously at the engine section, Stout Research Division, Dearborn, Mich., has now become affiliated with Ford Motor Co., same city.

P. NILAKANTAN, who has taken up permanent residence in India, is now scientific assistant to the chief inspector of aircraft, Civil Aviation Directorate, Simla, India. He was formerly at the Indian Institute of Science, Bangalore, India.

RAYDELLE I. JOSEPHSON has resigned her position as assistant patent attorney with Sperry Gyroscope Co., Garden City, L. I., N. Y., and is returning to Altadena, Calif.

Previously sales engineer, Firestone Tire & Rubber Co., **WILLIAM A. SMITH** has been transferred from the Washington, D. C., to the Akron, Ohio, branch of the company.

G. S. STAUNTON recently was appointed director of sales, Eclipse Machine Division, Bendix Aviation Corp., Elmira, N. Y. He was formerly assistant director, automotive sales, Bendix Products Division, South Bend, Ind.

Formerly officer in charge of aeronautical engineering instruction, Royal Canadian Air Force, Technical Training School, St. Thomas, Ontario, **A. A. PEEBLES** has been placed on the R.C.A.F. Reserve of Officers and has resumed his pre-war appointment at the Provincial Institute of Technology and Art, Calgary, Altadena, Can.

BRUCE T. VICKERY, who previously had been group leader, Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn., is now serving in the U. S. Navy and is stationed at Pensacola, Fla.

W. H. FISHER, a lieutenant colonel in the U. S. Army Infantry, has been transferred from Camp Maxey, Tex., to Hugo, Okla.

ROBERT BRAYMAN, formerly assistant foreman, Aircraft Screw Products Co., Long Island City, N. Y., and **DONALD H. MARTIN,** formerly engineering service manager, Thompson Products, Inc., Cleveland, are now members of the Armed Forces of the U. S.

HARRY I. HAZZARD is now chief engineer, Salsbury Motors, Los Angeles, Calif. He was formerly development engineer, McCulloch Aviation, Milwaukee, Wis.

LT. JAMES C. HAYES has been transferred from Kirtland Field, Albuquerque, N. M., to Las Vegas Army Air Field, Las Vegas, Nev.

THOMAS G. VALENTY, formerly experimental engineer, D. W. Onan & Sons, Minneapolis, is now in the U. S. Marine Corps, and is stationed at Miramar, San Diego.

WILLIAM H. McQUISTON, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind., has been promoted from junior engineer to field engineer.

Previously laboratory engineer, Caterpillar Tractor Co., Peoria, Ill., **ROBERT E. KENNEMER** is now serving in the U. S. Navy as Seaman First Class, Radio Technician.

HERMAN W. BAER may be contacted at Western Electric Co., New York, N. Y., where he is serving as tool design engineer. He was formerly foreman and production engineer with Engineering Service Co., Long Island City, N. Y.

GEORGE R. JAMIESON, who had been production liaison engineer, Wright Aeronautical Corp., is now serving in the U. S. Army at Ohio State University, Columbus, Ohio.

MILLAR F. CLARKE has been named assistant to the superintendent, Kaiser Industries, Denver, Colo. He was formerly engineer, mechanics, Kaiser Co., Inc., Iron & Steel Division, Pittsburgh, Pa.

CALVIN C. CHANG is now in the Public Relation Division, Marmon-Herrington Co., Inc., Indianapolis, Ind. He was formerly connected with the same company, c/o the Chinese Embassy, Washington, D. C.

GERALD R. ALMY, a first lieutenant in the U. S. Army, is now sales officer, Quartermaster Corps, Freeman Army Air Field, Seymour, Ind. He was formerly attached to the 80th Quartermaster Co., A.P.O. 665, c/o Postmaster, N. Y.

OBITUARY

Hal H. Strouse

Hal H. Strouse, machining engineer, Timken Roller Bearing Co., died recently as the result of a heart attack. He was 47 years old. Mr. Strouse had been in the machine shop field since 1915, when he was connected with the National Supply Co. He later joined Toledo Machine & Tool Co., Oil Well Supply Co., and Fostoria Screw Co., before coming to Timken in 1916.

...CARGO STOWAGE Becomes Air Lines Operating Problem

by W. C. MENTZER and E. C. MITCHELL
United Air Lines, Inc.

1944 National Air Cargo Meeting

(Excerpts from paper entitled "Cargo Tiedown and Stowage")

WHEN commercial airlines were converted for military use, all interior trim, seats, lining, and floors were removed. In their place heavy plywood floors were installed. Tiedowns were secured to the floor beams. The entire interior of the old passenger cabin became a large cargo pit over 20 ft long with a maximum carrying capacity in excess of 5000 lb.

Military expediency required the shipment of airplane control surfaces, airplane engines, building material, and other large containers of high density cargo. At first a maze of rope was used to secure the cargo, but when the hazards and operating problems attendant upon rope became evident, several contracting airlines began experiments with nets. These nets were reduced in size so that six nets could be used in each airplane, an arrangement which proved satisfactory.

When the Air Transport Command issued a directive to all carriers relative to the installation of Evans Tiedown Kits in all airlines-operated military cargo airplanes, experimentation was reduced to a minimum. Evans equipment is made up of two general parts. For large boxes, oil drums, and similar bulky pieces, a rod and beam combination is best used. By means of a jack mechanism, similar to the friction jack used for automobiles, the load is secured by applying the required pressure to the top of the beam through the rod and lock. Irregularly-shaped pieces such as an exhaust collector ring may be held securely with a rope and tightener.

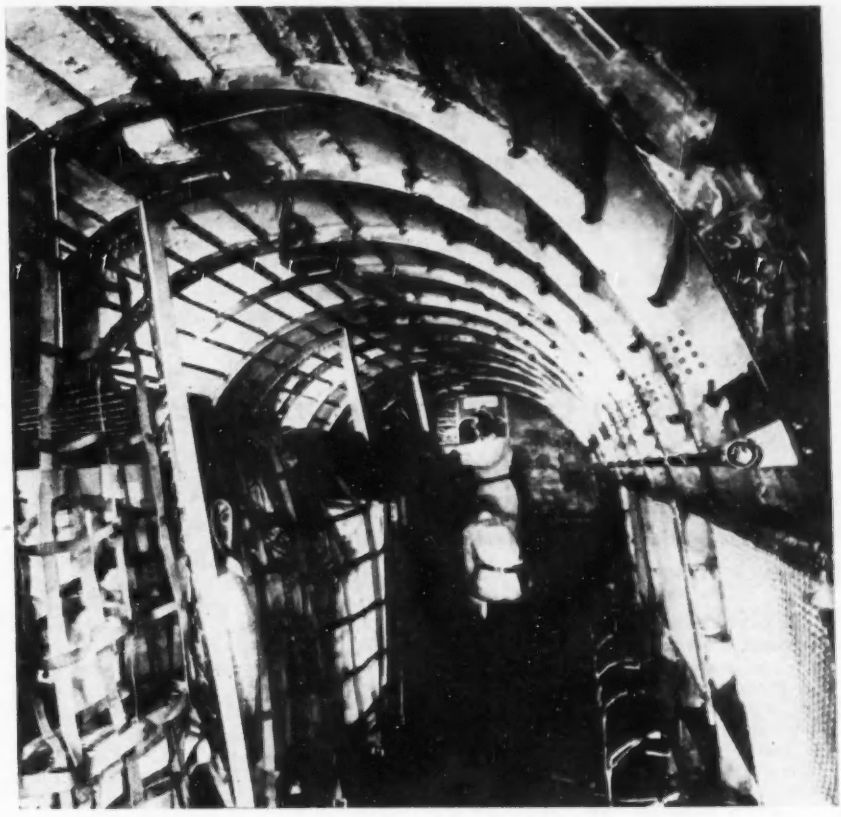


Fig. 1 – Remodeled cabin of a domestic cargoliner, showing new large cargo pits on the left side of the airplane

Major obstacle to adequate tiedown on military aircraft used in cargo operations has been the lack of tiedown rings or fittings used in the airplane. However, a floor has been developed whereby tiedowns are attached to the floorboards and floorboards in turn are bolted to the floor beams. This permits spacing of the tiedowns for maximum utilization while reducing the number of fittings and holes in floor beam flanges and webs.

An investigation of the character of cargo to be carried provides a very definite index to the type of tiedown and stowage equipment required. In an effort to obtain some idea of the trends in post-war air cargo, an extensive survey is being conducted by United Air Lines.

As the data are collected, it is recorded under three general headings: the first indicates the individual shipment densities in pounds per cubic foot; the second indicates the individual shipment size trends; while the third shows the individual shipment weights.

The trend indicates that average densities of all three forms of shipment follow a common pattern. Ninety per cent of air express shipments are in the 13 to 17 lb per cu ft bracket. Eighty-five per cent of the rail express falls within the 10 to 15 lb per cu ft group. Obviously war shipments were not used in accumulating these data.

Regarding the size trends for the three types of service, 98% of the air express fell in the 24 in. or smaller group. Ninety-one per cent of the rail express shipments are in the 40 in. classification, while 88% of the truck shipments are 35 in. or smaller.

Trend in weights shows that 89% weighed below 8 lb. Rail express shows 91% in the vicinty of 17 lb, while truck shipments follow with 84% in the vicinity of 24 lb. The term "shipment" is used to indicate individual pieces as inspected and checked for accuracy of weight and dimensions.

For the past year, United Air Lines has operated domestic cargoliner flights. Each

Air Cargo Promises

cont. from p. 23

severe becomes the manufacturing or marketing emergency necessary to justify the added expense.

Producers will sometimes find the higher distribution costs by air an actual ultimate economy. For example, as new products are put upon the market which have not been customer-tested, the producer may prefer to tiptoe along, matching his production to actual orders. In this way, air cargo could satisfy customer demand and permit the producer to conserve his investment in the new item.

When peace comes there will be a world-wide scramble for manufactured goods of all kinds. Even air transportation will not be too fast nor too costly for the person wanting a new vacuum cleaner or electric refrigerator.

Air cargo will grow most rapidly where the hauls are longest and the surface transportation poorest – the time differential is more pronounced and the cost spread narrower. That immediately suggests international commerce. In the foreign field, although competition is almost entirely by water, air cargo will quickly make itself felt because boats are slow. They operate only port to port and surface transportation beyond foreign ports is often inadequate and very costly.

Air cargo is not limited for the future to existing commercial airlines. Their increasing resources and highly capable organizations will be intelligently devoted to freight service. But, they are limited to fixed routes and stations. Their rates must cover a wide range of commodities for the shipping public, which they must serve under their obligations as common carriers.

The greatest opportunity for getting down into low-priced air transportation will exist for operators who may be more interested in new means of marketing than in running a transportation industry. This refers to the contract carrier, who need follow no specific routes, serve any particular points, nor publish his rates 30 days in advance.

airplane on this operation has been completely revamped with new large cargo pits on the left side of the airplane in the cabin, as seen in Fig. 1. These pits are about 75 in. long and 48 in. wide, and the full height of the cabin. In operation, the cargo is piled in the pit and secured by means of an adjustable net. Adjustable straps are provided to take care of varying size in cargo loads. The use of this type of net makes it possible to secure 1600 lb of cargo in one operation.

The use of nets changes tiedown problems entirely, since a definite weight advantage can be gained. We believe that for regular air cargo service, individual piece tiedown is not required, but rather a restraining of the load should be used in order to limit the vertical and horizontal movement to a negligible amount. On the other hand, plane load shipments could utilize the standard restraining net, or if the shipment required a special type of tiedown, a minimum of change would be needed in the airplane.

Gear Design Governs Performance

by FRED BOHLE
Illinois Tool Works

▪ 1944 National Tractor Meeting

(Excerpts from paper entitled "The Design of Gear Teeth")

THE picture which is to be drawn of a pair of gears should not only show the shape and proportions of the teeth, but also their relationship to the teeth of the mating gear. The active length of the line of action is limited by the outside diameters of the two gears.

The distance between successive gear involutes along a line running tangent to the base circle is called the "base pitch" and is obtained by multiplying the circular pitch by the cosine of the pressure angle.

As a rule, when a pinion has a low number of teeth, the mating gear has a high number. In other words, it is usually the demand for high ratio which forces the designer to select his pinion teeth low. When such ratios of 4 to 1 occur, a method called the long and short addendum system is used, in which the addendum of the pinion is increased the same amount by which the addendum of the larger gear is decreased. The amount of increase is usually 50% of the standard addendum.

Long and short addendum gears are produced with standard hobs by simply sinking in to standard pitch diameter plus clearance from the increased outside diameter of the pinion, and correspondingly decreased outside diameter of the big gear. They have the same base circles as standard gears.

Long addendum gears must not be confused with oversize gears. Oversize gears are those which run on larger-than-standard center distances. It is one of the many advantages of the involute that it is independent of center distances.

Length of the line of action, the overlap, and the use of standard addendum and depth still do not tell all there is to know about gear teeth. In order to determine what they really look like, their method of production must be considered. True tooth shapes are best produced on the drawing board, magnified from 10 to 50 times, by rolling one sheet of tracing paper over another containing the picture of the hob tooth. The outline of the hob tooth is traced through several times until the full form is generated. The pictures of both gear teeth, produced on separate sheets of tracing paper, are then transferred to the line-of-action picture.

When gears are to be shaved or ground, the situation becomes complicated. The addenda of shavers are longer than those of the mating gears because they must shave beyond the last point of contact. Therefore, hobs which precede a shaving operation are made with extra depth.

With the many methods used to obtain strength and accuracy, care must be taken that the active involute profile is maintained without interference. Therefore, dimensions must be given, fixing the length of the active involute profile. These dimensions must be in such a form that they can be read at the time the involute is checked.

Involute checking is done on fixtures using interchangeable base circles. Any point on the involute is determined by a definite amount of angular roll or a definite linear travel on the straight edge. This edge has a scale and it is most commonly used to specify definite points on the involute. A complete gear drawing should show, in scale readings, the minimum start of involute.

If mating gears are to go together their tooth thicknesses must be held. The figures for thickness include a definite allowance for backlash, which is about 5% of the tooth thickness per gear. Pitch line tooth thicknesses are measured by calipers which, however, are difficult to operate and not particularly accurate. Thus, it is better to express tooth thickness measurements in the form of wire or block readings. These readings should have tolerances which take into consideration requirements for the gear and the possibility of maintaining them.

The best designed gear may be an absolute failure unless a definite grade of workmanship is maintained. This means that certain tolerances for spacing, involute, runout, straightness, or helix angle must be held. All errors result in noise, wear, vibration, or uneven running. Errors in helix on spiral gears or straightness on spur gear teeth result in reduced areas of contact. The same applies to misalignment in mounting.

Gear performance and gear noise are the direct result of design and accuracy. However, it is well known that helical gears run smoother than spur gears, although the latter are more economical to produce. This is due to the nature of the contact between involute helicoids, which develops gradually on one side of the gear and then spreads across the width. Helical gears should be so designed in width and helix angle that the action of the pitch line helices alone provides for complete carry-over action from one tooth to another.

Another way to reduce noise and smooth out the action of gears is to relieve the involutes slightly near the tip of the tooth. This is done particularly on hobbed and shaped gears but not on shaved and ground gears. All standard gear generating hobs are automatically made to cut a small amount of tip relief, and the effect of this relief is to let the driven gear lag slightly and thus pick up gradually any spacing errors which might be present.

If proportioned well and correctly designed, the gears will serve their purpose

Passenger Car Practices Influence Truck Designs

by ROBERT CAS
The White Motor C

▪ Cincinnati, Nov. 2

(Excerpts from paper entitled "Motor-Veh Powerplants and Transmission Line

THE influence of the passenger car easily make itself strongly felt in the ter of transmission designs for future mercial vehicles, and an added impetus be given to this development by a general adoption of the automatic transmission in the bus field, particularly the service bus. It seems reasonably true that post-war cars, automatic transmissions be freely offered, and that they may be the hydraulic type, the torque-converter and the straight mechanical type. When come to the general commercial truck there are several other aspects to be ered, and much of what we do with missions will, in turn, depend on high development as well as the possible omy, if any, with automatic transmissions long-distance operation.

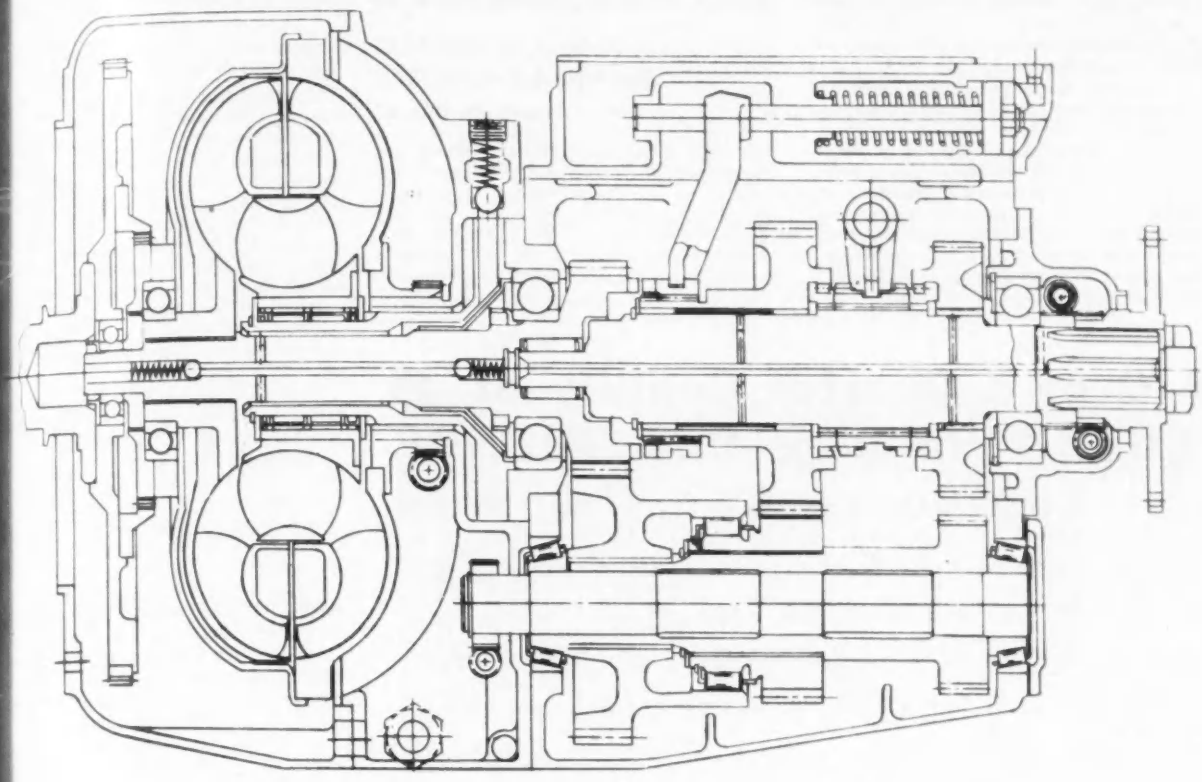
The basic requirements for automatic transmissions are:

1. Elimination of manual operation of clutch.
2. Elimination of manual operation gear-shift lever.
3. If gear steps are retained, the shifting should take place automatically at the correct time under all conditions.
4. The engine must be available for braking.
5. The driver should have a certain amount of overruling power.
6. This overruling power should not require any buttons or levers.
7. Transmissions should be simple.
8. No special service problems should arise.

Various approaches are possible to satisfy these conditions, the three major ones being

1. Mechanical automatic transmission, including automatic friction clutch.
2. Hydraulic coupling plus automatic mechanical transmission with or without automatic friction clutch.
3. Hydraulic torque-converter with or without auxiliary automatic transmission.

In selecting the proper basic design, should be borne in mind to try to obtain many other advantages as possible. For buses or trucks where clutch wear has been an important service problem, it would be highly desirable to eliminate this complete. The best way to do this is, of course, by eliminating the friction clutch altogether. This could be done by adopting the hydrau



■ Fig. 1 – Automatic torque-converter transmission with 2-speed auxiliary

ig coupling with an automatic transmission and omitting any friction clutch. The mechanical transmission in this case would have to have the same number of gear steps as the mechanical automatic transmission.

Omitting Steps Is Aim

In general, automatic transmissions are somewhat more expensive than the standard transmission. This added cost is partly caused by the required automatic controls. By reducing the number of gear steps, the controls can be simplified. The ultimate aim, of course, is to omit gear steps altogether. The above-mentioned types of automatic transmission do not offer this possibility.

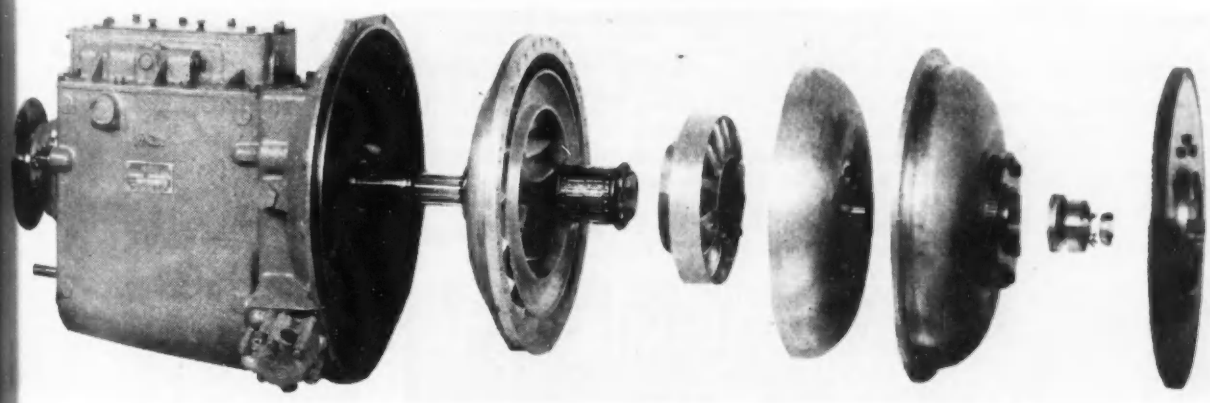
One way to eliminate or reduce the number of gear steps is offered by the hydraulic torque converter, the development of which has made substantial progress during the last years.

Obviously, the efficiency of a hydraulic torque converter adopted for propulsion of automatic vehicles is of the utmost importance. It is also of extreme importance that a sufficient torque ratio be provided so that the vehicle can move its maximum load under all conditions. Unfortunately, the characteristics of a torque converter are such that if it is desired to have a high torque ratio, the efficiency curve suffers accordingly. For that reason, a certain happy medium must be struck, and for buses and trucks it will generally be found that if it is desired to obtain a high efficiency, the torque ratio that can be obtained under these circumstances is not sufficient to propel the vehicle. It is, therefore, desirable to make up the loss of this torque ratio by introducing an auxiliary transmission in back of the converter.

An automatic transmission of this type is illustrated in Fig. 1. The design is compact, rugged, and simple; the weight is practically the same as that of a standard transmission. This example is shown with a 2-speed auxiliary transmission, and, of course, for each speed the infinitely variable speed and torque of the converter is available.

Fig. 2 shows clearly the converter parts of a similar transmission, which has been operated successfully in experimental bus installations.

The controls for this type of transmission



■ Fig. 2 – Exploded view of converter parts of automatic torque-converter transmission

are of the utmost importance. Since a torque converter has a variable efficiency, the controls should be of a type that tend to produce maximum efficiency of the drive at all times and under all conditions.

If it should be some long time before the development materializes for the truck field, we may find designs using synchromesh units as a means to simplify gear shifting. The cost of such transmissions is high, however, and it is questionable whether the overall life of the synchromesh transmission with a good driver would be extended over an orthodox version to make the complication, weight, and other factors worth while.

Adapt Aircraft Generators to Ground Vehicle Uses

by J. S. DECKER
Electric Auto-Lite Co.

Detroit, Dec. 4

(Excerpts from paper entitled "Trends in Automotive Generator and Regulator Design")

THE development of the generator has very closely paralleled that of the automobile from the standpoint of increased output, and improved performance, with appreciable increase in size, weight or cost.

A factor which must be given consideration by future engine designers as generator capacities increase is the transmission of increased power by the belt. Improvements in armature construction, methods of inserting conductors and building commutators, together with new means of impregnation have permitted armature speeds to rise from about 4500 to 10,000 rpm. Pulley diameters and belt contact areas have now reached a minimum, and it will become necessary both to increase the size of pulleys and belt contact areas to reduce belt slippage and increase life.

The automotive industry is presently contemplating improved headlighting, which if adopted, will require generator outputs of the order of 50 to 75 amp. To enable the generator to carry heavy-connected electrical loads to engine idle and low-driving speeds, it may be desirable to consider the development of a two-speed generator drive mechanism, to operate the engine at high speed ratio when engine speed is low, automatically changing to a lower ratio when engine speed reaches a predetermined value.

It may also prove desirable to incorporate in the automotive generator certain of the more readily adaptable features of generator design now being used in aircraft.

While the cost of the aircraft type generator, which has an output-to-weight ratio nearly five times that of the present automotive generator, is necessarily higher than that of the automotive generator, a number of its features, as compensating windings, brush rigging design, and high field currents appear suitable for a generator designed to produce the optimum in output performance and cost.

Following closely behind progressive design changes in automotive generators have come a series of changes in the methods and means used in controlling their output.

This general development eventually produced two systems; one comprising a shunt generator whose current output is limited to a safe value by a vibratory current control unit, and the voltage of which is maintained at a relatively constant value by a similar vibratory voltage control. In the second system, instead of the vibratory current control unit, the standard third-brush current control is used in combination with a vibrating voltage control, which maintains a relatively constant voltage on the system as long as the available peak output of the generator is greater than the demand of the system.

Though both of these methods remain in present use, the later trend is toward the replacement of the third-brush generator with a shunt generator and its control, due primarily to the need for a flat output curve with speed, and a realization that a constant voltage system would be a practical necessity as automotive vehicle demands increased.

Heretofore, the practice basically has been to keep the battery charged and let the battery carry the electrical demand of the system, with the battery voltage necessarily determining the system voltage.

The altered concept is approached in the shunt type system with full voltage and

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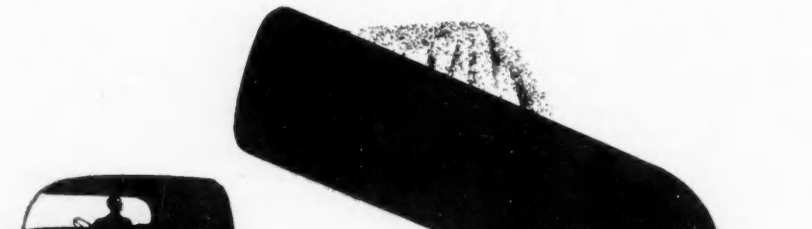

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urrent regulation, designed to enable the enerator, rather than the battery, to carry he electrical load of the system, even at idling speeds, while the battery serves chiefly s a stand-by, and as a source of current or the operation of the starting motor and arking lights.

For the near and middle distant future, t appears probable that the fundamental esign of the present vibrating type regu-ator will remain in predominant use, with odifications and refinements from time to ime, particularly in the methods of sealing gainst moisture and dust, quality of con-act materials, and the design and arrange-ent of component units to facilitate manu-acture and improve the physical and elec-rical stability of the product.

..SAE PRESIDENT Rates Engineers By Productivity

(Digest of talks on "Engineering Organization" delivered before several SAE Sections by J. M. Crawford)

AN engineer's ability as a department manager should be rated by the results he gets per dollar expended, rather than by the size of his organization, SAE President James M. Crawford emphasized in talks given in recent months before the Western Michigan, Indiana, and St. Louis Sections. Engineers in many plants, he said, are getting marvelous results despite relatively inadequate funds, facilities, and personnel.

He paid high tribute, also, to the subcontractors who made possible the building of the United States' industrial empire in peacetime and without whose major contributions in the technical as well as the production field our Arsenal of Democracy could never have been built to war-winning proportions.

Speaking on "Engineering Organization," he pointed out that quite different set-ups are needed for a department concerned chiefly with development of a new product, for one concerned with refinement of an established product, and for one concerned with reproduction of a reasonably frozen design. The impact of war, he added, has further widened the range of engineering organization problems.

In his own Chevrolet engineering department, he said, military projects were put directly into the regular engineering department, with sufficient men handling them, in accordance with the urgency of the development. No problem of reorganizing came up, therefore, when the whole department became a military set-up. "There was no problem," he stated, "as to what to do with the organization which might have been concerned solely with civilian or commercial vehicles."

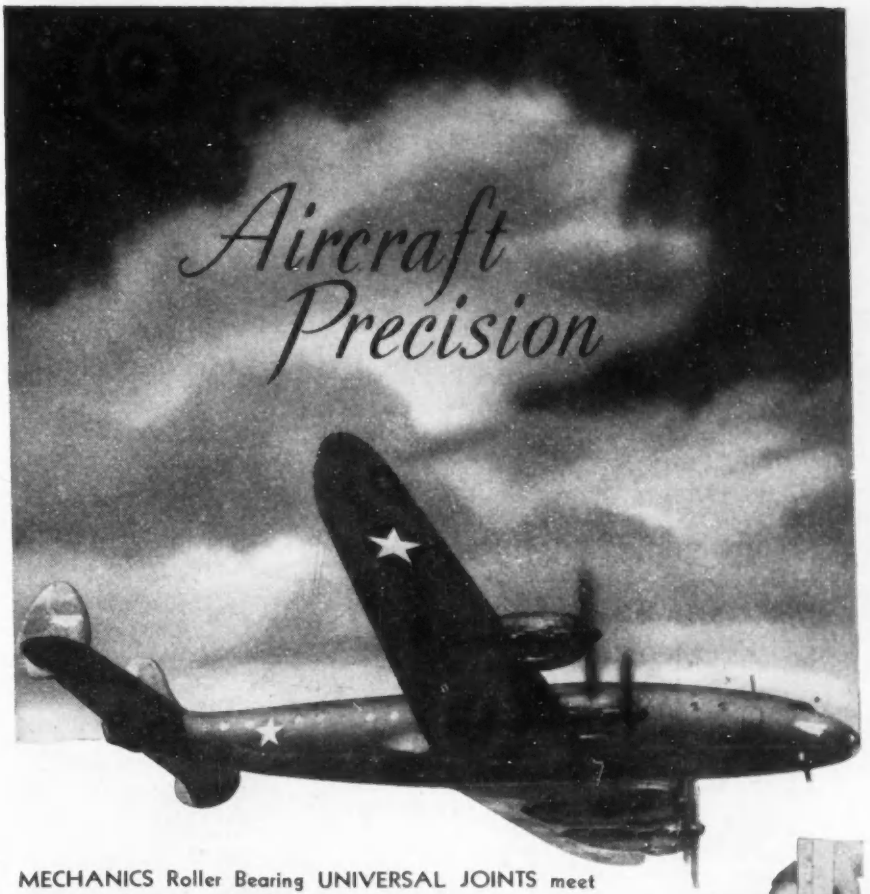
Besides the normal objectives at which an engineering department's work is aimed, Mr. Crawford said, the degree to which a particular management relies on its engineering department, and the engineering personnel available for employment also affect strongly the needed set-up in any given case.

Again using Chevrolet as an example, Mr. Crawford showed how an engineering department organization was changed to fit the requirements of management. When the general manager was an executive whose background was manufacturing, many executive decisions were made as a result of direct contact, and the engineering organization functioned smoothly and efficiently without too formal an organization. Later, when a general manager took over whose background was chiefly financial – and after considerable volume expansion already had taken place as a result of a competitive opportunity having been seized firmly – the engineering organization was redesigned to meet the new management needs, and to handle the continued refinement of an established product.

Mr. Crawford brought out many interesting phases of his own philosophy in detailing for his audiences various elements of the Chevrolet set-up.

He believes, for example, that the average organization chart may easily have a tendency to pull down morale of some department members, rather than to lift it up – and he urges modification of formal charts to alleviate this trouble when necessary.

He emphasizes the importance of getting fast action on service complaints – and favors the direct action possible when the service



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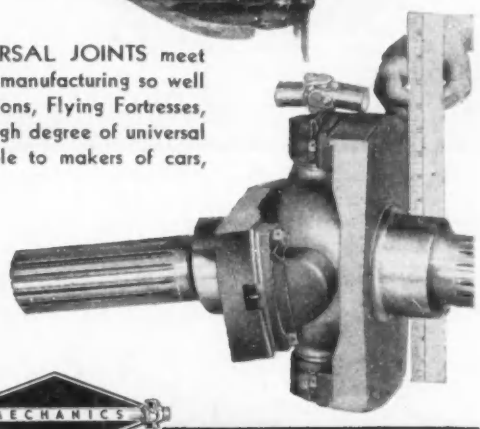

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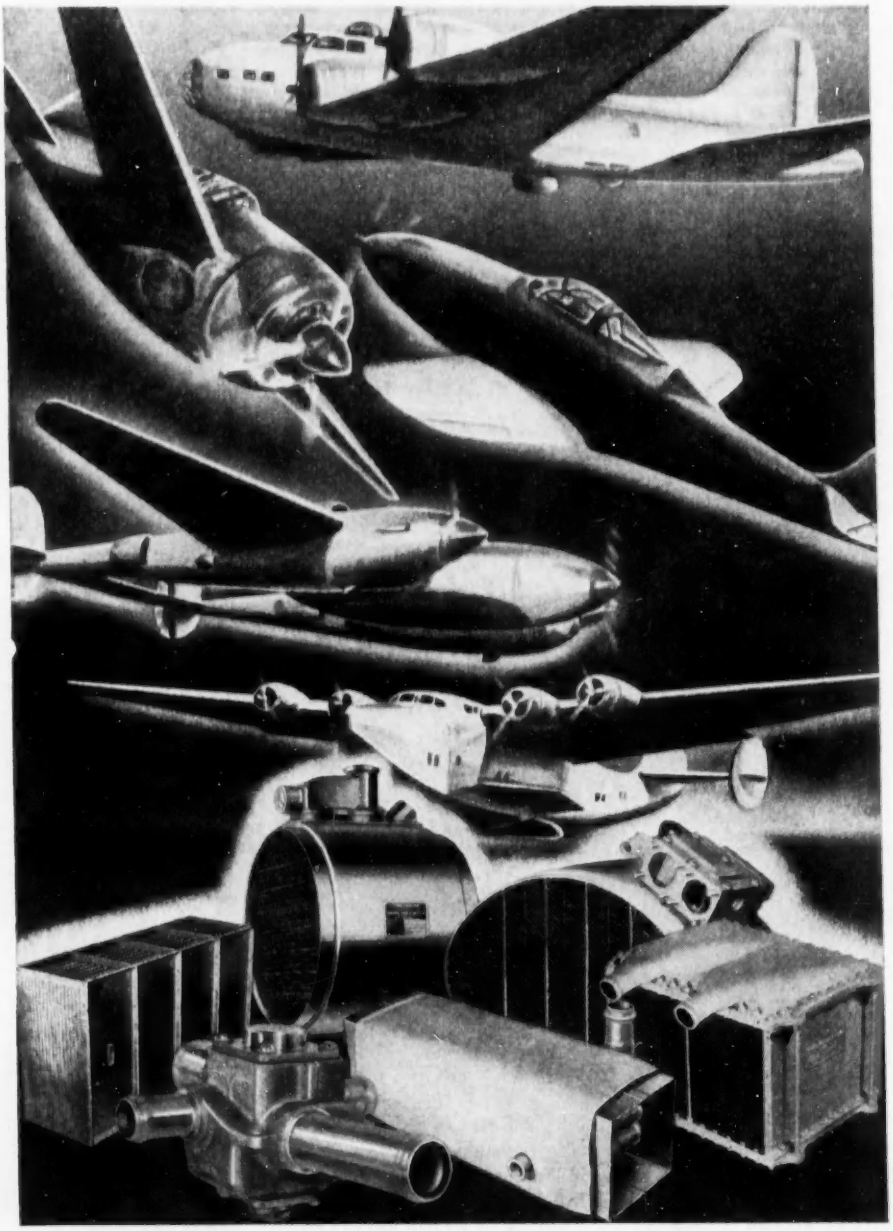

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contact engineer reports directly to the chief engineer.

And, finally, he is "agin" conferences and committee meetings at regular stated intervals so far as engineering department administration is concerned, although he stresses the importance of such meetings in cooperative engineering work where agreement of divergent interests is strong.

REDESIGN CROWDED INSTRUMENT PANELS

by M. G. BEARD
American Airlines, Inc.

▪ 1944 National West Coast Aeronautic Meeting

(Excerpts from paper entitled "Future Operational Requirements in Relation to Cockpit Design")

INSTRUMENT panels of transport airplanes have become so crowded that there is little available space left for large instruments which will be required for future air traffic control and instrument landings without radical changes in conventional instrumentation and instrument location.

To accommodate instrument landing facilities which are being installed and will be installed on major airports, it is necessary to install the glide path indicator in a prime position on the flight instrument panel in close relationship with the clock, airspeed indicator, altimeter, directional gyro and gyro horizon. This instrument is used for a very small percentage of the time the plane is in flight; yet when it is in use, the pilot is executing the most important maneuver of the flight and must have instrumentation as readily visible and as closely coordinated with other necessary instrument approach indications as possible.

Air Traffic Control Provisions

The traffic system devised for the future must adequately handle increased volume with greater precision and safety than has been accomplished in the past if airlines are to expand and create transportation facilities at the anticipated rate.

Radar and allied radio devices coupled with ground circuits will be required in the cockpit for the air traffic control system as it will eventually be adopted. In order to accommodate the large volume of traffic it will be impossible to use two-way voice communications, except for special purposes, and therefore automatic position reporting and traffic position assignments from base traffic control will be necessary to keep traffic flowing smoothly.

Radio altimetry, radio apparatus for defining traffic lanes, and other navigation aids will require fluorescent screens for indication, and these must necessarily occupy a center position on the instrument panel which must be visible to both pilots. These units could be incorporated into one central screen between the flight instrument panels of the captain and first officer. Automatic traffic control signals and directions will appear on a panel adjacent to the central screen clearly visible to both pilots.

The important point is that cockpit ar-

rangements and provisions for transport planes, now in design stages and to be placed in operation about three years from the end of the war, should be laid out to accommodate traffic control and radio navigation provisions.

Flight Engineer's Station

To gain the necessary exactness in execution of flights along the airways and to maintain desired efficiency of engine operation, the addition of the flight engineer on large four-engine airplanes in domestic operation appears inevitable.

I believe the flight engineer should work in as close cooperation with piloting crew members as is physically possible within the limitations of the airplane layout. The greater the number of crew members working together in one airplane, the greater the necessity for close coordination of efforts and movements.

A feasible layout for the flight engineer's position can be made directly behind the pilots, with front instrument panel low enough to look over and see the pilots' control pedestal and for the pilots to look back, see, and communicate directly with the flight engineer. Fundamental engine operating instruments can be located on the low panel in front of the flight engineer. Instruments of secondary importance, not required for engine control, can be located on a side panel. Such an arrangement should overcome much of the reluctance of operators and pilots to transfer routine engine operation and functions to a flight engineer when operating on domestic routes where takeoffs and landings are frequent and flight operations change rapidly.

War Looses Plethora of Troubles for Car Owner

by JOHN OSWALD
General Motors Corp.

▪ 1945 War Engineering-Annual Meeting

(Excerpts from paper entitled "Difficulties of Long-Time Ownership of Passenger Cars")

WHAT are some of the troubles which the many war-time drivers are now experiencing for the first time?

If the car owner doesn't have a garage, and thousands haven't, he is beset by malfunctioning door locks and window regulators. These minor troubles multiply when the car is in operation. The electrical system has become a problem on today's automobile because of the limited capacity of the battery and the length of time it takes the generator to replace the electrical energy which can be consumed so quickly.

Keeping down wear on front tires has become a major problem on many cars. Maintaining correct tire pressure has been the easiest of tire conservation efforts – and correct wheel alignment the most difficult. On the basis of long-time ownership, many of the front-end suspension systems should deserve more attention from engineers; a reduction in the expense of replacing worn functional parts and alignment procedure time would be appreciated by many owners.

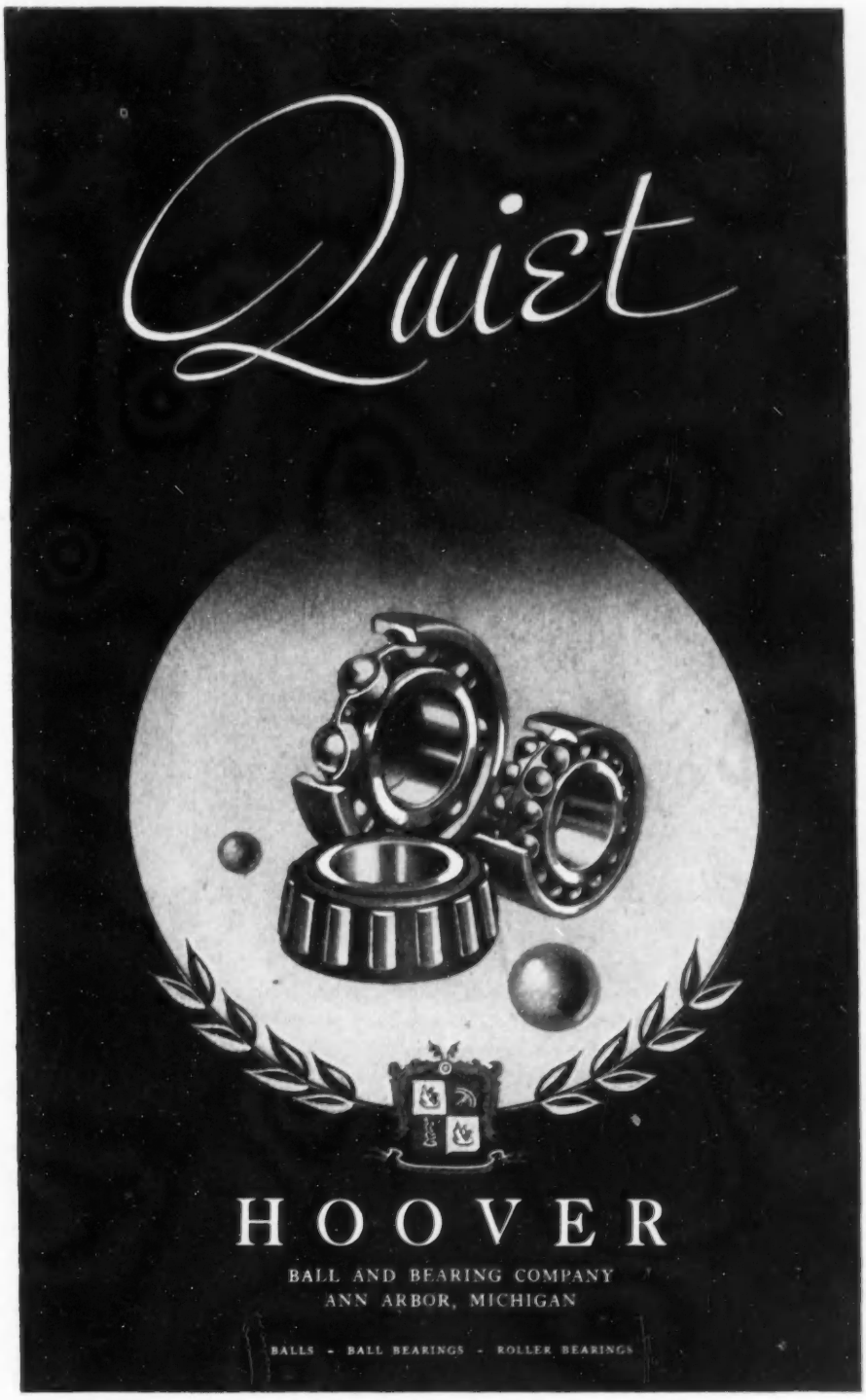
Corrosion difficulties also have increased in the last few years, especially in certain areas. Some of the places on automobiles which are more vulnerable to corrosion are body sills or rocker panels, lower edges of door panels, fender to body joint areas, window wells, drip mouldings, around the edges of luggage compartments, and on the sheet metal below radiator grilles.

The major fault for this condition lies in the retention of moisture at the affected areas, and when the moisture is laden with salt or calcium chloride, the extent of corroding is greatly increased.

Some owners who have experienced bad rust conditions blame it on the fact they have been compelled to keep their cars too long. These owners, in the period following the war, will be convinced more than ever that it is wise to trade in every year or every other year.

Another angle to the matter of body and sheet metal corrosion is that perhaps the present-day automobile owners have been educated by the industry to expect too much.

Certain corrosion problems perhaps may



be solved by new designs that will eliminate some of the joints. Interior surfaces undoubtedly will be preserved by better protective coatings and provided with improved ventilation and drainage. However, any additional cost for improvement will have to be reflected in the selling price of the cars.

Long-time ownership has made the driving public more conscious of the quality of exterior finishes and chrome plate. Many owners consider extensive amounts of chrome-plating on most car exteriors offer additional surfaces which are highly susceptible to corrosion. Judging from the appearance of "late models" this contention cannot be denied.

Current long-time ownership has made many owners more conscious of the quality of car interiors. Thousands are experiencing upholstering difficulties. Also, watching oscillations of gasoline gage hands and the ones on other jittery instruments has proved bad for the eyes. Peculiarly shaped cigar lighters and glove compartment doors are equally troublesome.

With respect to front door ventilating panes, body engineers still have a long way to go to outsmart experienced car thieves.

Regardless of these difficulties, however, there are countless owners who have been very well satisfied with their present cars. Convinced that the pre-war models were really good automobiles, the public will be ready to accept re-styled versions of the same models when factories are permitted to resume production.

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. . . . . FINANCING Of Air Lines Operations Demands Expert Planning

by COM. JOHN J. BERGEN, USNR

John J. Bergen & Co., Ltd.

■ 1945 War Engineering Annual Meeting

(Excerpts from paper entitled "Some Observations on the Financing of Aircraft for Local Air Transport")

IN the underwriter's approach to a question of corporate financing, the first questions which suggest themselves are: Does the business seeking capital serve a necessary and proper need; should the financing be done on an equity or on a funded or current debt basis; has the business permanence and the potentialities of profitable growth, and does the proposed issue of securities offer a fair return to the investor for the risk involved, so that the proposed financing may be safely undertaken by the underwriter? In the business of local air transport, the answer to these questions would seem to be in the affirmative.

Transport companies will no doubt be financed in the first stage along one of two lines: In one instance where the local company serves as a feeder to but one major airline, and in the other where it serves two or more major airlines.

It would be desirable in the first instance for local companies to be financed and controlled by local people entirely – that is, by interests residing within the territory served. This is true, at least, as far as equity issues are concerned.

If equity financing is well established on a proper basis, required funds for the purchase of new equipment can be obtained readily through the issuance of: (1) equipment trust notes along the line of the Philadelphia Plan, used often in financing purchase of railroad cars; (2) conditional sales contract used in financing purchase of automobiles and other chattels, and (3) chattel mortgage.

The least costly is the equipment trust, because of the high degree of confidence reposed in that type of security by the investing public.

For the construction or acquisition of the necessary real estate, hangars, and other fixed assets, the conventional first mortgage bond, or debenture, or note may be employed, whichever may be best adapted to the needs of the particular company.

Financing of this industry presents no special problem to the investment profession which cannot be adjusted to and served by the use of the same type of security by which private industry is now being served.

However, this industry will be subject to

control and regulation of some Governental authority, either state or national or h. Such regulation should and can be —to industry and the public alike. erefore, the industry must not be too ily fettered, but permitted to develop so it may serve both the public conve- nce and the national interest. The build- and financing of this necessary service st be done on a sound basis efficiently safely equipped.

..... ELECTRONICS eaded for Major Job in ircraft Control System

by LT. R. J. COLIN, JR.
ir Technical Service Command

945 War Engineering-Annual Meeting

Excerpts from paper entitled "Electronic Controls in Aircraft")

RITICS of electronic controls for aircraft question their reliability perhaps more an anything else. However, reports from e European Theater of War have demonated that such controls are highly prac- al and reliable. In the matter of altitude d low temperatures alone, electronic con- ols are getting many hours of flight tests hich would have been impractical to obtain efore the war.

No other type of control can be compared ith electronic types as far as adaptability concerned. From the manufacturer's view- oint it is most adaptable because it re- uires the least amount of modification of e controlled equipment. For example, an ectronic turbosupercharger control was sub- tuted for a hydraulic type control without quiring any modification of the turbo self.

Electronic controls are inherently light eight equipment mainly because of the all components which go into them. In e case of the electronic turboregulator me increase in weight resulted, but this as justified by the superior performance of e control.

Fortunately, the use of electronic controls uilt with high grade components does not reate maintenance headaches. At present, e chief job of maintenance on electronic ontrols is occasional tube replacements. De- igners of most electronic controls now in se on aircraft have simplified the field aintenance problem of this equipment reatly by making the electronic amplifier elf a "plug-in" unit. Thus, when an mplifier is suspected of failure in forward chelons, it is only necessary to substitute nother satisfactory one.

The problem of incorporating failing-safe eatures into the design of an aircraft con- rol always demands consideration by the esigner. The development of an automatic nverter changeover relay solved the problem f cylinder head failures on take-off due to xcessive manifold pressure. A reliable elec- ic power system aboard aircraft is very mportant, and in general, mechanical over- ules for electronic controls are not favored.

Perhaps the most appreciated quality of an electronic control is its maintenance of sea level performance at high-altitude temperatures and pressures. When pressure and temperature changes on the performance of a vacuum tube are considered, there is no inherent responsiveness to changes in the operating medium. On the contrary, electrical and electronic circuits themselves become slightly more efficient at altitude due to a somewhat lower effective resistance of the circuit conductors.

Stability of electronic circuits themselves can be handled as a routine design matter. However, operating stability of the complete controlled system requires more thorough study. For example, in the development of the electronic turboregulator, several cases of slow manifold pressure oscillations were encountered. Performance of any control can be ascertained fully only when that control is tested as a part of its controlled system and over the whole range of conditions that it will later be expected to perform over. Only in this way can critical points in the system be observed and dealt with. The most satisfactory way of accomplishing most of these tests is to fly a test airplane over its whole range of altitudes.

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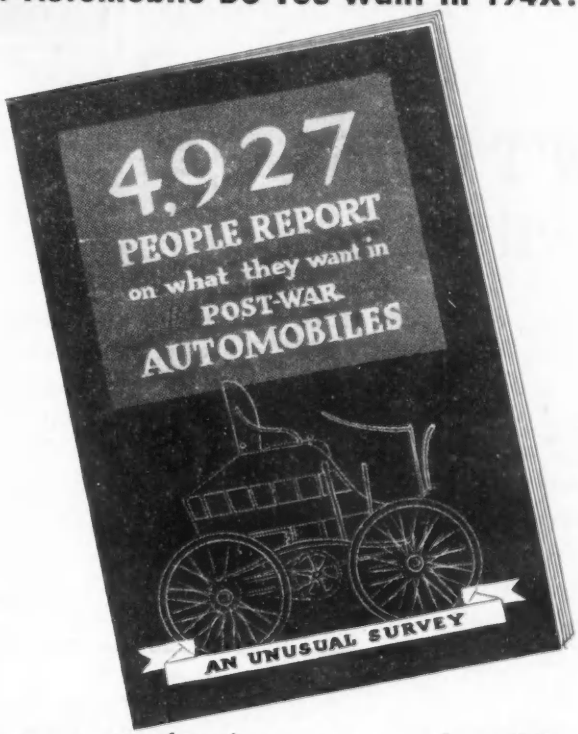

Based on a comprehensive survey conducted by The San Francisco Examiner for The American Society of Automotive Engineers, as presented at S. A. E. annual meeting, Jan. 8, 1945.

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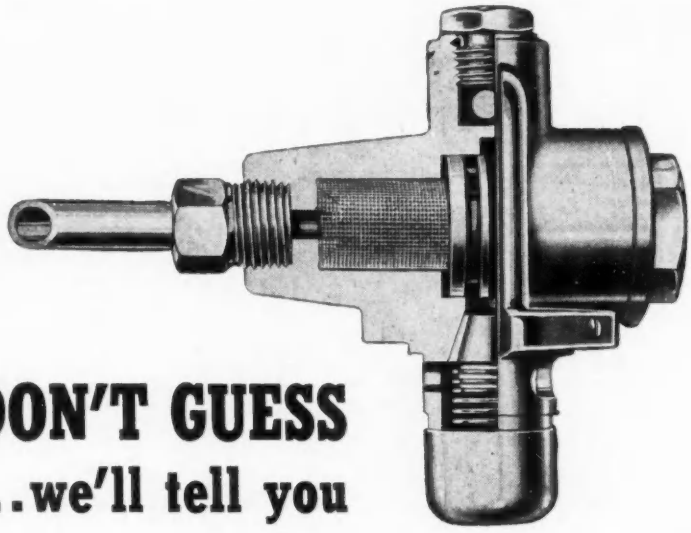
sidered is response to powerplant vibration. Two effects to be considered are: (1) vibration of the electron tube elements, known as microphonic response, and (2) excitation of high resonant amplitudes in some parts of the control. The use of shock rubber mountings has kept the first condition from being a problem. When the second condition gives trouble, the simplest immediate remedy is to change the shape or stiffness of the mating part, where a groove occurs. Most desirable would be to have our control non-responsive to all vibration.

Ability to control a function from several points simultaneously is highly effective. In the case of the electronic turboregulator, manifold pressure, speed and acceleration of the turbo, pilot's turbo boost control and the position of the wastegate all act simultaneously to control the function of the turbo. To attain such flexibility with any other type of mechanical control would require an extremely complicated and vulnerable arrangement.

Because of its unique amplifying properties an electronic control requires less energy of the controlling medium. By increasing amplification sufficiently, very small differentials of variation are obtained. Closeness of control is usually limited by mechanical backlash, inertia, and damping rather than by equivalent electrical factors.



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Long-Distance Flights Accentuate Importance Of Large Fuel Reserve

by CAPT. H. J. CHAS
Pan American Airways, Inc

■ 1944 National West Coa
Aeronautic Meetin

(*Excerpts from paper entitled "Analysis of Fuel-Reserve Systems for Long-Range Aircraft"*)

VARIOUS factors which compose the fuel reserve of long-range aircraft are the following:

One engine inoperative – In most modern aircraft on long-range flights, fuel required on three engines expressed in terms of nautical miles per pound versus the fuel required to fly on four engines is only slightly higher for all normal operating altitudes after the mid-point has been reached. In future aircraft, this problem may be paramount on certain routes.

In future long-range aircraft operating in the neighborhood of 25,000 ft, nautical miles per pound with one engine inoperative will be excessive due to high wing loading and only moderate power loading. Economic reasons will require the airplane to continue on flight at a lower altitude where nautical miles per pound will be about the same as they were at high operating altitudes.

Forecasting error in winds – Minimum forecasting errors allowing the maximum number of completed flights with safety must be used. Higher speeds and frequency of schedules will bring the present forecasted long-range flights into the zone of short-range flights.

Navigation error – New methods of radio navigation should eliminate about half of the present-day additional mileage required due to present navigational equipment.

Future equipment will also be able to give "fixes" disregarding weather which now requires aircraft to deviate from its course or to climb over an overcast to take a fix, in order to insure the pilot that the aircraft is progressing satisfactorily.

Residual fuel – Proper design may cut this factor in half, and this will give an additional payload of 150 lb, which should be more than enough to take care of increased weight in the design and leave the current more payload available.

Nautical miles per pound of fuel error – The following affect the efficiency of flight and will reduce nautical miles made good per pound of fuel consumed: Instrumental, atmospheric conditions, loss of power by carburetor heating, over-consumption of engines, and aircraft configuration changes.

Pilot errors – This factor can only be reduced by improved technique. The following are the main pilot errors affecting the reserve: Automatic pilot operation, deviation from course, deviation from flight altitude, and poor technique.

Reserve system – Total reserve required is broken down into:

1. Reserve required from point of departure to the equi-time point on three engines.
2. Reserve necessary from equi-time point on three engines to destination or alternate.
3. Fuel required to fly for one hour upon arrival at destination or alternate on three engines.

Fundamentally this allows the aircraft to have an engine failure at the equi-time point and to continue or return, and arrive against the additional fuel required for three engine flights, if any, plus additional reserve throughout the complete flight which will take care of the composite errors that might occur plus landing reserve.

...SAE STANDARDS

Contribute to Progress of Aeronautical Engineering

by ARTHUR NUTT
Packard Motor Car Co.

1945 War-Engineering Annual Meeting

(Excerpts from paper entitled "The Future of Standardization in the Aeronautical Industry")

THERE are 72 SAE committees and subcommittees working on aeronautical standards of all kinds, including advice to the armed forces on Government standards when requested to do so.

The Aeronautics Division of the SAE General Standards Committee has been authorized by the SAE Council to expand its activities into the sponsorship of research and special investigations which may lead to eventual practices or standards. Repeated statements from industry and Government indicate that this program has had hearty support and will continue to have it in the future. There should be an increased activity in connection with civil aviation after the war, and the extent in which airline personnel have participated indicates the interest from that field.

No standard promulgated by SAE is compulsory. Voluntary standards as dictated by practical and economic conditions are the only real standards in the final analysis.

SAE standardization is carried out with full cognizance of the part played by other professional and trade organizations, such as the American Iron & Steel Institute, the Air Transport Association, and the Aeronautical Chamber of Commerce of America. The necessary liaison has been established with the American Institute of Electrical Engineers, the Society of Aeronautical Weight Engineers, the Society of Testing Materials, the American Society of Mechanical Engineers, the American Society of Heating & Ventilating Engineers, the Coordinating Research Council, and others. All of these activities are coordinated with the SAE Electrical Equipment Committee as the prime responsible agency, as the SAE is interested in increasing and improving the quality of the ultimate product, the airplane, rather than any particular component of the airplane.

The SAE has been cooperating for many years with the standards organizations of other countries. This cooperation has been accelerated during the war, and at present all SAE Aeronautical Standards, Aeronautical Information Reports, and so forth, are being transmitted to England, Australia and Canada.

Specifically, SAE has built its standardization activities on the policy that the Society should be equipped to:

1. Sponsor the development of industry standards and specifications.

2. Advise on technical problems of broad industrial concern. In this respect, the Society should continue to be organized to carry out its responsibilities to both industry and Government.

In carrying on these activities, industry has found a need for the following types of standardization:

1. Aeronautical Material Specifications (AMS) – This identification is used for standard specifications for materials and processes conforming with currently established engineering practice.

2. Aeronautical Standards (AS) – Dimensional standards based on sound engineering practice.

3. Aeronautical Recommended Practices

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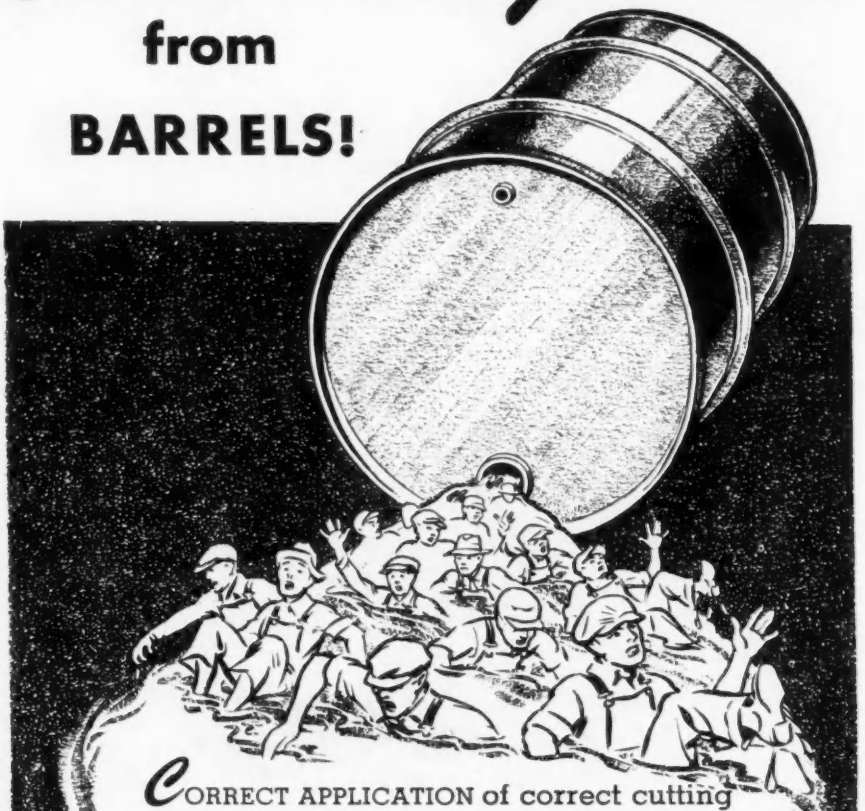

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The war has emphasized the importance of the interchange of technical information and ideas through committees and meetings organized for that purpose. Such exchanges should continue and can be performed to the material advantage of the participants even though they may be in strong competition.

The success of standardization can be achieved only by selling management on the necessity of:

1. Standardizing the standardizing agencies in respective industries.

2. Standardizing under the sponsorship of professional engineering societies free from political or trade influences.

3. Standardizing by groups of experts who will consider all phases of the problems.

4. Providing standards to be used on a voluntary basis only.

5. Continuing to give the program adequate support by furnishing sufficient technical experts and finances.

Carburetor Productive Alike of Good and Ill

by JAMES H. RA...
Carburetor Service C...

■ **Spokane Group, Feb...**

(Excerpts from paper entitled "Carbure... and Carburetion")

THE carburetor has three distinct fu... tions; namely, to measure, to mix ... to atomize. It's a popular thought, tho... that a carburetor is responsible for poor ... buretion, loss of power, fouled spark p... and other common motor ailments.

It has been found that downdraft ... buretors give better fuel distribution ... the updraft type, although a few ma... of cab-over-engine design use updraft ... lack of limited space on motor installa... Gas mileage is always the paramount pr... lem with owners of all types of vehi... Our experience has proved that if, in ... vicing any and all makes of carbure... the original specifications are followed, ... buretors will give desired results even ... der present operating conditions.

With the advent of downdraft carbu... tors, manufacturers discarded brass ... struction as used in updraft types, ... turned to the use of cast iron and zinc ... materials. One primary reason for adop... this material was to effect heat contro... the float bowl. Even with these designs ... have experienced considerable difficulty ... boiling in the bowl itself, to such an ex... that operation under extremely high te... peratures has caused considerable trou... in starting.

Float level setting is another factor relating to and controlling gas consumption. When float levels and idle systems are correctly set, other systems are not likely to cause any extreme loss of mileage provided they have remained according to original specifications. It must be remembered that 70% of the driving is done in the idle system.

Carburetion

Carburetion is the function of many units, one of which is the often neglected manifold. Large manifolds are hard to carburet because of the lower velocity of the mixture at moderate and medium speeds. Regardless of how well a manifold is designed, distribution will carry between cylinders. This variation increases with manifold sizes. Thus, intake and exhaust manifolds definitely effect carburetion.

Improved manifold design is necessary. Heat valve controls, which usually stick in the open position and cause rapid accumulation of carbon in the intake manifold, receive little attention. These units should be watched carefully and removed whenever necessary and given a thorough cleaning by sandblasting. It has been our experience that 85% of poor acceleration complaints have been remedied by the simple process of sandblasting. Intake and exhaust ports which are not thoroughly cleaned when manifolds are removed from the motor also require special attention.

■ ■

Ramblings

cont. from p. 21

In an informal discussion of design problems faced in the heavy diesel industry, Rudolph Schneider, Busch-Sulzer chief design engineer, traced the solutions for **ST. LOUIS SECTION** Feb. 8 . . . Prefacing his talk with a short summary of the development of his organization during the past 35 years, Mr. Schneider followed the history of American diesel design from the 1912 65 hp engine which weighed 470 lb per hp, to the modern 3000 hp unit in marine use . . . Highlight was the revelation that supercharging can increase the rated power of the 2-cycle diesel by as much as 50% without danger of overloading . . .

Jose E. Jury, president, Business Collaborators, Inc., is Section's new field editor, replacing Geoffrey Hazard, who is now serving Socony-Vacuum in New York City . . .

Passenger-car meeting of **SOUTHERN CALIFORNIA SECTION** held Feb. 8 started with special showing of new war films released by the War Department which featured thrilling action on various fronts around the world . . . Citing the contribution of the car industry to the war effort, Verne Orr, vice-president, Chrysler Motors of Calif., described how the word "impossible" has been thrown out of the automotive dictionary to bring about some of the miracles of war production . . .

Causes of excessive vehicle breakdowns and remedies which brought unbelievable results were related from his personal experience as an automotive adviser for the U. S. Navy by Edwin G. Gilliland, who tied these findings in with future maintenance problems . . . Suggestions he offered for fleet operations were: drive vehicle, not herd it; proper preventive maintenance; correct use of good lubricants . . .

Fuel vapor loss and recovery was discussed by Art Savard, design specialist, Consolidated Vultee Aircraft Corp., at Feb. 20 luncheon meeting of San Diego Group of Southern California Section . . . Of five methods of vapor control and recovery, namely (1) removal at the refinery of high ends of the fuel which are normally lost during boiling; (2) de-aeration of fuel on the ground; (3) pressurization of fuel tanks; (4) refrigeration of fuel; and (5) condensation of fuel vapor during flight, the author preferred the latter as the simplest and most practical solution to the problem . . . This method utilizes a heat exchanger similar to an oil cooler or intercooler, is estimated to be 80% efficient, and would require the addition of about 125 lb to the airplane's weight . . . Thus, a saving of 120 to 540 gal or 720 to 3240 lb could be possible . . .

Animated discussion following A. T. Colwell's account of water-alcohol injection for

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- **how turbocharging increases engine power and the most practical methods in use today**
- **efficiency of the internal combustion turbine and factors in performance — mechanical aspects of gas turbine plants**
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spark-ignition engines before the 150 mem-bers and guests at **PHILADELPHIA SEC-TION** meeting Feb. 14 disclosed follow-ing points . . . Use of water with a 2-cy-direct fuel-injection supercharged engine would be satisfactory . . . Small passenger vehicles will operate from 1000 to 15[illegible] miles on a gallon of alcohol-water mixture with the Thompson Products system, which has caused no crankcase corrosion . . . While alcohol-water mixture has a low freezing point, precautions must be taken to prevent corrosion in fuel lines . . . Best effects ob-tained with full heat on the manifold . . .

Reviewing the principles underlying mag-netic particle and fluorescent penetrant in-spection, W. E. Thomas, second vice-presi-dent, Magnaflux Corp., discussed at **MIL-WAUKEE SECTION** Feb. 2 their applica-tions in both the manufacture of materials and parts and in the periodic inspection of parts to prevent breakdown in service . . . Supplementing his talk with slides of mag-naflux and zyglo indications, Mr. Thomas insisted upon the importance of inspection to everyone concerned with a product . . .

With 21 years of experience at Ross Gear & Tool Co. to furnish him with informa-tion, W. K. Creson, Ross' vice-president of engineering, was well-authorized to talk to **OREGON SECTIONITES** March 1 about front-end stability of commercial vehicles . . . In presenting the various problems involved in this subject, the speaker introduced a novel demonstration of multiple coil springs with weights attached at the ends which showed the problems of oscillations per min-ute encountered when dealing with the ve-hicle's stabilization from the tire contact to the top of the carrier . . .

More than 450 members and guests turned out at **METROPOLITAN SECTION** March 1 to hear a symposium presented by A. T. Colwell, vice-president of Thompson Prod-ucts Inc., and former SAE president, and Harry O. Hill, manager of the gasoline in-jection department, American Bosch Corp. . . . Past-Chairman Merrill C. Horine served as moderator, under the chairmanship of Richard C. Long, the Section's Passenger Car vice-chairman . . . The subjects of alcohol-water injection, and solid fuel injection for gasoline engines was given a thorough work-ing over by an enthusiastic audience . . . A quorum meeting of the Governing Board was held by Section Chairman Robert H. Clark following the meeting . . .

Over 87 persons attending **PITTSBURGH SECTION** meeting Feb. 27 heard brisk dis-cussion following paper presented by C. E. Betz, vice-president, Magnaflux Corp., which dealt with magnaflux in the automotive in-dustry . . . Consensus of opinion was that safety factor has increased due to more com-prehensive inspection . . .

Ladies' night program of **WASHINGTON SECTION** Feb. 13 was devoted to the story of "China, As Americans Now Find It"—from the eye-witness account of Alex Taub, chief engineer, Foreign Economic Adminis-tration, who was sent on a mission to that country to study its transportation and in-dustrial problems . . . Although present con-ditions are not too cheerful, Mr. Taub held out promising hopes for the future industrial possibilities of China . . .

APPLICATIONS Received

The applications for membership received between Feb. 10, 1945, and March 10, 1945, are listed below. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

Baltimore Section: John B. Crane, William T. Dyas, George Charles Milan, Lt.-Com. Kenneth Weston Windsor.

Buffalo Section: F. Gurbin, Henry Heck Jones, Baboo Ram Teree.

Canadian Section: Lt. George Edward Colgate, Lt. Herbert Ludovici, James R. Mott, Carlyle Dean Read, Kenneth F. Supper.

Chicago Section: Gerry H. Bach, Edmond B. Cooper, Lt.-Col. W. J. Corr, Alexander Dreisin, Joseph Fischer, William H. Fowler, Charles Haneline, Howard R. Klauer, Mark C. Nicholson, P. O. Norton, A. J. Peterson, George Edward Thompson, Joseph Frank Ziskal.

Cincinnati Section: Maurice Dams, Matthew Lawman, Jr., William H. Moore, Jr., Frank Henry Myers, Jr., Paul Edward Speiser, William Leslie Steinwachs.

Cleveland Section: John F. Amos, Russell S. Atkinson, Richard Etnier Brown, William Marsh Baldwin, Jr., Richard Everett Brown, Donald C. Cornell, Robert Thompson Gage, Samuel D. Gunning, Bernard E. Rodin, Lawrence M. Rose, Ralph N. Wiesenberger, The National Refining Co.

Colorado Group: Lt. Billy H. Hastings, 2nd.

Detroit Section: Townsend F. Beaman, C. A. Brady, Bert G. Burnside, Gilbert Burrell, C. J. Erb, Eugene B. Etchells, Jerome S. Felts, LaVern M. Godden, Charles Goga, James A. Hall, Harold F. Harness, E. C. Peter, Edwin Gerner Kaunitz, Raymond H. Laird, Ralph A. Marriott, Charles E. Nadeau, Arthur E. Proctor, Jr., Frederick Cruger Pyne, M. D. Rand, James E. Spittle, C. L. Stevens, Ray F. Thornton, August Toelle, Paul William Walaskay, William P. Wood.

Indiana Section: Chester Hull Barger, Louis G. Crooks, Thomas Lloyd Hendricks, Robert H. Hill, Arthur O. Moneyhun, Norman B. Tichenor, Peter P. Wood.

Metropolitan Section: William J. Connelly, John B. Eick, Macon Fry, Gerald E. Hynan, Ensign J. Packard Laird, M. K. Mehta, Jose E. Oliver.

Mid-Continent Section: Oscar O. Funderburg, Will D. Parker.

Milwaukee Section: William O. Creutzburg, Charles James Marshall.

New England Section: Anthony Gambardella, Lewis W. Kerr, Albert Emile LaRosee.

Northern California Section Louis Kresse Burns, George F. Gayer, Harry Everett Karst, Harold Raymond Knott, Marvin D. Knox, Ralph H. Langner.

Northwest Section: Edwin L. Griffin, Keith K. McDaniel, G. B. McKail, Alfred P. Nelson, Raymond Elroy Peterson, R. A. Sanguinetti.

Oregon Section: Joseph De Tilla, Floyd B. Chapman, C. A. Dillinger, M. W. Ekman, Julius Goussoin.

Peoria Section: John L. Deffenbaugh, Jr.

Philadelphia Section: William C. Avery, Otto A. L. Keser, Frederic C. Meldola.

Pittsburgh Section: Gerald S. Adelman, Roman L. Sailer, Porter R. Wray.

St. Louis Section: William P. Harrison.

Salt Lake City Group: Jay Percy Bywater.

Southern New England Section: Clarence William Laubin, Loyd E. Neil, Albert E. Schwartz, Coleman S. Williams.

Southern Ohio Section: Robert H. Eaton, William Grant Pontis.

Southern California Section: John G. Baehr, Harvey C. Biggs, Jr., Robert Wells Corder, Richard F. Englert, Peter B. E. Erwin, P. B. Heineck, Otis C. Johnson, Lt.

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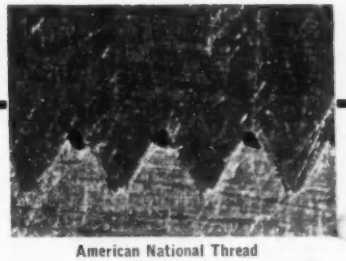

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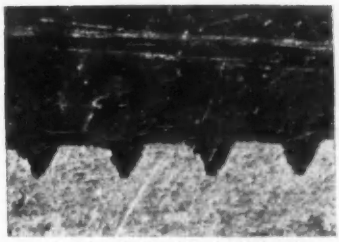

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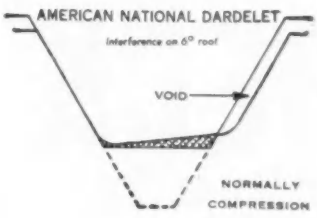

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NEW MEMBERS Qualified

These applicants who have qualified for admission to the Society have been welcomed into membership between Feb. 10, 1945, and March 10, 1945.

The various grades of membership are indicated by: (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate Member; (SM) Service Member; (FM) Foreign Member.

Baltimore Section: J. R. Gourley (A), Capt. Russell W. Meals (J), Austin Leroy Reynolds (J).

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Cincinnati Section: Richard P. H... bus (J), William Joseph McTighe (J)... Alan Montrose (M), Ralph E. Morrison (...

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Detroit Section: Milton S. Bald ... Arthur C. Berg (M), James Leonard B... ham (J), Robert W. Burton (J), Ch... J. Cook (J), Jack R. Doidge (J), Lew... Favorite (A), Edward Martin Gelman ... Theodore F. Lapinski (J), Clarence M. ... Dowell (M), Jack Dempsey McNamer ... Harold Moore (J), Donald H. Nelson ... Ralph S. Ragsdale (J), Edwin S. Ross ... John H. Shiner (A), William Leo Shull (...

Indiana Section: Lt. Alfred Earl C... (J), Otto L. Kraft (A), Joseph S. Willi... (A).

Kansas City Section: Chester E. B... (A), Allan C. Redden (A).

Metropolitan Section: Theodore ... Endresen (J), W. A. Gresh (A), Willia... Hamilton (J), Robert William Houska ... Stanley Lehrer (J), Jack C. Maillard (... Ralph Newitter (A), J. Gordon Ogi... (A), John T. Robinson (J).

Mid-Continent Section: Capt. Ro... O. Benecke (J), John Leon Brogan, Jr. ... O. M. Setrum (M).

Milwaukee Section: William Cha... Benson (M).

Mohawk-Hudson Group: Edward ... Hoke (A).

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Peoria Group: Harold R. Johnson ... Paul Vernon McWherter (J).

Philadelphia Section: Albert C. Sod... lund (M).

St. Louis Section: Lofton D. Crow (...

Southern California Section: Th... dore Dwight Buettell (J), Chadwick S. D... walter (J), Russell Albert Elfors (J), Jo... H. Engel (A), James B. Ford (M), F. ... Frederick (J), James W. Gaines (J), W... bur I. Gieseke (A), John D. Giltsch (A... Bernard W. Gruber (A), Herbert O. Hans... (A), Merritt Carl Holman (J), K. R. Jam... son (A), Howard H. Jefferies (A), Willia... A. Johnson, Jr. (M), Steven W. Leong (J... Lloyd Gerald Ludwig (J), Ensign Thom... E. Mails (J), Howard V. More (J), Dona... B. Morse (A), John H. Newby (A), Wilb... C. Oliver (M), Frank J. Pommer (M... Daniel S. Stouffer (A), Henry Chess Tri... (A), Marold Carlyle Wadley (J), Floyd ... Wallace (J), John T. Weber (J), Reub... Wolk (J).

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